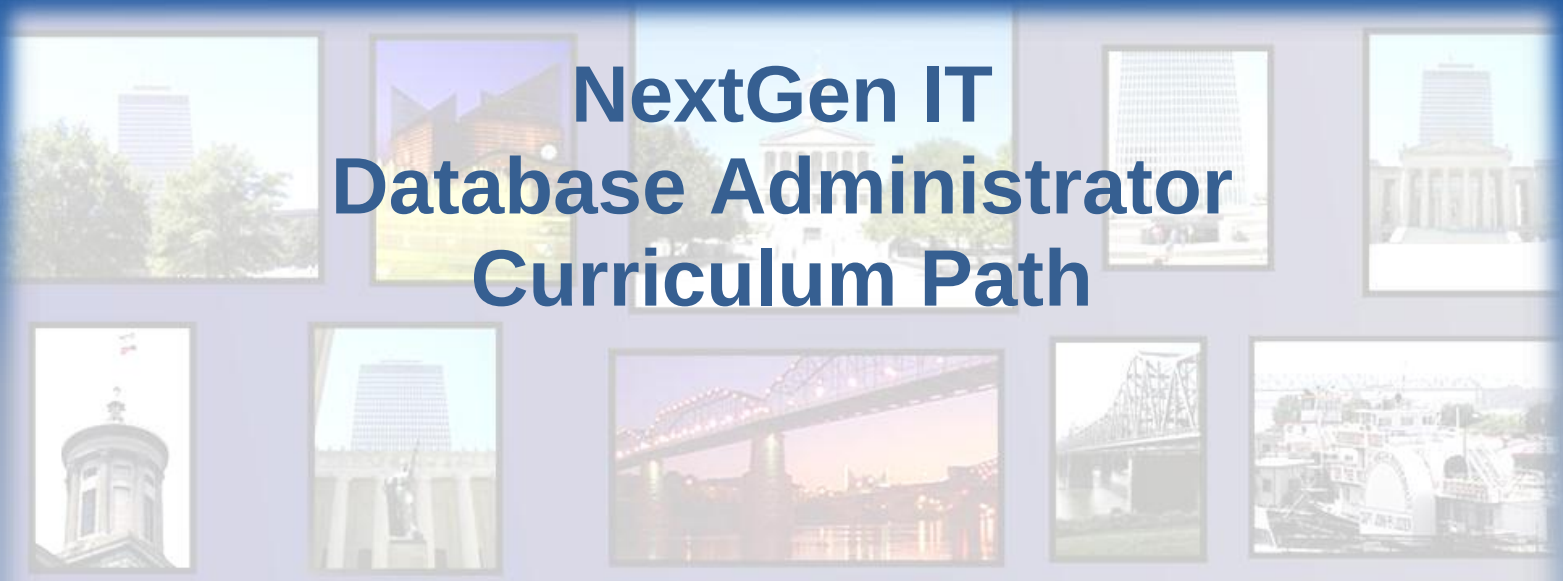
NextGen IT Database Administrator Curriculum Path



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Prepared By:

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We also would like to acknowledge and thank the personnel who participated as Subject Matter Experts, and those who provided leadership and support to the project.

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DATABASE ADMINISTRATOR CURRICULUM PATH INTRODUCTION

SAIC is pleased to provide this Database Administrator (DBA) Curriculum Path document for review by OIR and the selected SMEs in order to facilitate further discussion about the training and labs that would support the NextGen IT objective of improved IT deliverables.

This Curriculum Path for the Database Administrator (DBA) job classification represents the knowledge, skills, and abilities (KSAs) and tasks associated with the new State of TN job classifications. The CP also reflects input, suggestions, and feedback from State IT Subject Matter Experts (SMEs), and in consideration of IT Industry Best Practices. The following is a summary of the themes that came out of the SME workshop.

- Many people working in IT today did not start out to be in IT but they moved into IT roles as business evolved toward the use of modern technology. As the State works toward better deliverables it will be important to give personnel the opportunity to fill-in and further develop their foundational KSAs even as they are improving their KSAs with current technologies (Microsoft SQL Server and Oracle).
- The NextGen IT CPs should support the use of industry standard SD processes across the State and establish understanding of when and how to tailor the processes to fit the scope of the deliverables. The use of proven, standard yet adaptable processes will give all IT personnel a common language and approach to SD that will enable them to identify problems, reduce errors, and increase customer satisfaction.
- Establishing a culture of informed and engaged IT project teams will positively impact the outcome of deliverables. Training should promote team communication, collaboration, respect for roles, and awareness of the inter-connectivity of the project tasks. As the Developer SMEs pointed-out, developing code without awareness of the larger scope of the project, or the impact of what you produce is counter-productive. Some described writing code and never knowing if what they did was useful, or effective, or actually used at all. Communication within the IT team and with the customer and end-users increases the likelihood that problems can be identified earlier and addressed prior to production and that the final deliverable will be a better solution.
- Training must improve IT personnel ‘soft’ inter-disciplinary skills and abilities such as communication, critical thinking, decision making, and active listening. Without these skills and abilities, the IT professional is limited in their ability to effectively use technical knowledge and skill.
- Ultimately, Database Administrators will be able to use the Curriculum Path to:
    - Remediate and/or reinforce foundational KSAs required for DBAs by completing training required in the junior levels.
    - Develop and demonstrate the knowledge, skills, and abilities required to perform the tasks relevant to their job classification and level.
    - Develop KSAs to prepare to move into a more advanced DBA level.
    - Develop the ‘cross-training’ KSAs that will improve team work, communication, understanding, and ultimately improve deliverables.

Suggested CP Format

This Curriculum Path is presented in a chart format. Job Classification levels are displayed in rows along the left-hand side of the chart, (Junior, Intermediate, and Advanced). All of the training and learning activities that make up the curriculum path are organized into one of five Areas of Competency needed to develop well-rounded IT Professionals, (Technical, Organizational / Process, Communications, Cognitive Development, and Administration/Management/Leadership). These Areas of Competency are displayed across the top of the chart. The related courses and learning activities are displayed in these columns according to their relevant job classification level and in the recommended order of completion.

Curriculum Path Format

	AREAS OF COMPENTENCY				
	Technical Training	Organizational / Process Training	Communication Training	Practical Reasoning Training	Administration/ Management/ Leadership Training
Junior Level					
Intermediate Level					
Advanced Level					

Five Areas of Competency to Develop Well-Rounded IT Professionals

The five Areas of Competency were selected based upon the types of knowledge, skills, and abilities identified in the KSAs for each new State of Tennessee Job Classification and are recommended to emphasize the importance of developing competency in inter-disciplinary knowledge, skills, and abilities in tandem with technical competence.

Technical: The technical courses provide the IT systems developer with the knowledge, skills and abilities to perform the tasks required to analyze, design, develop, test, deploy, and maintain applications pursuant to best practices and user requirements.

Organizational / Process: Organizational and Process Oriented courses are interdisciplinary courses that will be provided for all IT professionals in all State Agencies. The goal is to develop a common set of expectations, and a framework for working together on IT projects regardless of which department and what project. Topics include IT Governance, Software Development Processes, and Project Management Processes.

Communication: Communication is an area of competency that was emphasized over and over again by the SMEs from all job classifications and all State Agencies. These courses will include written and verbal technical communication, active listening, verifying understanding, customer service, and team building.

Practical Reasoning: Courses in this area of competency will expand upon the professional's ability to actively and skillfully conceptualize, apply, analyze, synthesize, and/or evaluate information gathered and to use these skills to create more effective, efficient, and appropriate deliverables within their job classification.

Administration/Management/Leadership: Leadership courses will cover the knowledge, skills, and abilities that are necessary to manage work, motivate and support individuals and teams. These courses are most often going to appear at the more advanced levels of job classifications.

Comprehensive Competency Development and Verification

A significant objective for the NextGen IT transformation is to develop well-rounded IT professionals who can work together to deliver high quality, effective, timely technology products and services to State Government and the people of Tennessee. Facilitators will use teaching methods that will maximize the State IT Professional's opportunity to practice, apply, and perform during the class so that the student leaves the classroom and returns to their work place fully prepared to use the new learning in their work. The desired training delivery approach will include instruction and demonstration activities, guided exercises and practice activities; and competency verification activities.

The importance of dynamic, interactive competency verification cannot be overstated. Every course regardless of the type (instructor-led, computer-based, facilitated workshops,) will provide students with at least one competency verification activity or 'lab.' These labs will require the participants to apply the knowledge, skills, and abilities gained to execute a course related task. A written exam may be used as a competency verification activity; however, the desire is for students to use and apply new knowledge, skills, and abilities prior to leaving the class. This may be accomplished through independent assignments on the computer such as writing code or through activities that requires the students to work together to identify the best technical solution, solve a problem, or produce a product.

These competency verification activities are a core strategy of the new training curriculum, aimed at instituting a continuous improvement culture to verify, build upon, and develop competency. The expectation is for the student to integrate learning from all five Areas of Competency as they progress through the curriculum path. Competency verification can and should include a requirement for students to use KSAs, obtained in previous classes. Students will understand this expectation and facilitators will be responsible to ensure that they are working to support this objective through their classroom, lab, and workshop activities.

Final Competency Verification Lab

In order to complete verification of competency for each job classification level, and/or to move into another job classification it is recommended that IT professionals pass a final competency lab that will be facilitated by working professionals with appropriate skills and subject matter knowledge. This competency lab will require the participants to demonstrate knowledge, skills, and abilities from all five Areas of Competence.

DATABASE ADMINISTRATOR CURRICULUM PATH DRAFT

The Curriculum Path Charts will provide an overview of the courses and learning activities for each level. To view the Course Outline click the course.

Junior Database Administrator

Junior Database Administrator	Technical			Organizational / Process	Communication	Practical Reasoning
	Designing to Maximize Customer Satisfaction			State of TN IT Professional Orientation	Introduction to Technical Communication	Resources to Improve Practical Reasoning
	Introduction to Networking			Team Roles and Responsibilities	Technical Documentation Skills	
	SQL Server 2008 Operating System Option A. Introduction to Windows Server 2008 R2 Operating System	SQL Server 2012 Operating System Option A. SQL Server 2012 Administration Skills Upgrade	Linux and Unix Operating Systems Option A. Introduction to the Linux and Unix Operating Systems	Time Management	Customer Service	
	Introduction to Storage/SAN Technologies					
	Introduction to Relational Database Design Concepts					
	Introduction to SQL Programming Language					
	Microsoft SQL Server 2008 Path A. SQL Server 2008 Comprehensive Introduction	Microsoft SQL Server 2012 Path A. SQL Server 2012 Comprehensive Introduction	Oracle 11*g* Path A. Oracle Database 11*g* Comprehensive Introduction			
	B. SQL Server 2008 Database Administration	B. SQL Server 2012 Database Administration	B. Oracle Database 11*g* Administration			
	C. SQL Server: Backup, Recovery and Tuning	C. SQL Server: Backup, Recovery and Tuning	C. Oracle Database 11*g*: Backup, Recovery and Tuning			
	New Trends in Database Technology					
	Junior Database Administrator Learning Lab					
	Junior Database Administrator Competency Lab					

Intermediate Database Administrator

Intermediate Database Administrator	Technical	Organizational / Process	Communication	Practical Reasoning	Administration/ Management/ Leadership
	Relational Database Design	TN Standard Software Development Process Foundations	Team Dynamics	Using Critical Thinking, Problem Solving, Decision Making Techniques to Improve Deliverables	

	Developing Complex SQL Queries			Improving understanding between technical and non-technical project stakeholders		
	Microsoft SQL Server 2008 / 2012 Path A. Application Development for SQL Server Databases	Oracle 11*g* Path A. Application Development for Oracle Databases				
	B. SQL Server T-SQL Programming	B. Oracle PL/SQL Programming				
	Intermediate Database Administrator Learning Lab					
	Intermediate Database Administrator Competency Lab					

Advanced Database Administrator

	Technical		Organizational / Process	Communication	Practical Reasoning	Administration/ Management/ Leadership
Advanced Database Administrator	Advanced Relational Database Design		Project Management Basics	Technical Communications for Leads/Managers	Collaborative Troubleshooting / Problem Solving / Decision Making	Team Building
	Microsoft SQL Server 2008 / 2012 Path A. Implementing Data Models and Reports with SQL Server 2012	Oracle 11*g* Path A. Implementing Data Models and Reports with Oracle 11*g*		Advanced Team Dynamics		
	B. SQL Azure	B. Oracle VM				
	Advanced Topics					
	Advanced Database Administrator Learning Lab					
	Advanced Database Administrator Competency Lab					

TECHNICAL COURSE DESCRIPTIONS

The technical courses provide the IT database administrator with the knowledge, skills and abilities to perform the tasks required to analyze, design, develop, test, deploy, and maintain applications pursuant to best practices and user requirements.

CROSS PLATFORM COURSES

Designing to Maximize Customer Satisfaction

This course is an introduction to visual software design concepts including user interface design considerations, creating applications that meet ADA standards, and an introduction to style sheets. It prepares the IT software developer to provide quality services for the customer/end-user. Other topics designed to enhance customer satisfaction include: identifying stakeholders, managing expectations, user acceptance testing, communication, and post-implementation evaluation.

Duration: 2 or 3 Days

Learning Objectives

Upon completion of this course, attendees will be able to:

- Identify the stakeholder/customer
- Manage expectations
- Create a prototype for a given application
- Understand the importance of user acceptance testing
- Create a user interface that meets ADA minimum standards
- Create a user interface that operates properly regardless of platform
- Create a user interface that meets user requirements
- Create a user interface that has proper navigational controls
- Create a user interface for the desktop environment
- Create a user interface for the internet
- Identify good vs. poor user interface design
- Create a style sheet
- Perform a post-implementation evaluation

Course Outline

- Who is the Customer?
  - Stakeholders/Customers
- Managing Expectations
  - Communication with the Stakeholder
  - Developing Prototypes for Stakeholder Approval
    - Why prototype?
    - Types of prototypes
    - How to create a prototype
- User Acceptance Testing
  - What is UAT?
  - When should it be done?
  - What should be done with the results?
- Introducing human-computer interaction
  - What is a user interface?
  - Attributes of a good interface
  - Leveraging our cognitive skills
  - Leveraging our perceptual skills
  - ADA Standards

    - Non-visual Factors
- Introducing user-centered design
    - User-centered design
    - Design iteration
    - Analysis phase
    - Design phase
    - Verification phase
- User interface design principles
    - Attributes of a good interface
    - Map to the user's mental model
    - Be consistent
    - Provide control
    - Provide feedback
    - Recover gracefully
    - Provide flexibility
- Navigation
    - How to create a task flow diagram
    - Five navigational structures
        - Sequential navigation
        - Hierarchical navigation
        - Star navigation
        - Grid navigation
        - Network navigation
        - Hybrid navigation
- Application interfaces
    - Primary window
    - Secondary windows
    - Menus
    - Controls
    - Toolbars
    - Status bar
    - Input: General
    - Input: Mouse Input
    - Input: Keyboard
    - Interaction: Selection operations
    - Interaction: Editing operations
    - Interaction: Transfer operations
    - Windows user assistance and help
    - Writing for desktop applications
    - Platform specifics
- Web interfaces
    - Client-server explained
    - Client-server performance issues
    - Introduction to Style Sheets
    - Web visual design
    - Links
    - Platform or browser
- Post-Implementation Evaluation
    - What information should be gathered?
    - Implementing Changes
    - Documenting for Future Projects

Lab Exercises: Attendees will be presented with examples of both good and poor GUIs without distinction. They will determine what is appropriate and effective and what is poor design and ineffective. Given a simple project, attendees will create a prototype of the interface and use a style sheet to modify its appearance.

Introduction to Networking

Network fundamentals are covered in this course. Topics include: how switches and routers interconnect using multiple vendors' equipment; IP addressing and how to create subnets; how TCP/IP works and is configured on various devices; to capture and view network traffic using a protocol analyzer; the various wireless network options available; basic security and firewall issues; how Ethernet works and how all of the various forms can be connected; the basics of layered network protocols; the difference between logical and physical network segments; how to install Cat 6 UTP and fiber optic cables; how VLANs function; when and how to use NAT; function of various routing protocols such as RIP, IGRP, and OSPF; an overview of WAN technologies; functions of NetBIOS and NetBEUI; and benefits and issues of Instant Messaging.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Explain how switches and routers interconnect using multiple vendors' equipment
- Understand IP addressing and how to create subnets
- Understand how TCP/IP works and is configured on various devices
- Capture and view network traffic using a protocol analyzer
- Explain the various wireless network options available
- Utilize basic security and firewall issues
- Understand how Ethernet works and how all of the various forms can be connected
- Explain the basics of layered network protocols
- Explain the difference between logical and physical network segments
- Install Cat 5e UTP and fiber optic cables
- Explain how VLANs function
- Know when and how to use NAT
- Understand the function of various routing protocols such as RIP, IGRP, and OSPF
- Understand the basics of WAN technologies
- Explain the functions of NetBIOS and NetBEUI
- Know the benefits and issues of Instant Messaging

Course Outline

Network Overview
- Defining a Network
  - Reasons to Use a Network
- Network Components
  - End Devices
  - Operating Systems
  - Network Infrastructure
  - Network Types
  - Network Services

Network Functions and Standards
- Generic Network Functions

- Standards Organizations
    - Institute of Electrical and Electronics Engineers (IEEE)
    - Common WAN Serial Interface Standards
- Internet Organizations
    - Internet Standards Process
- OSI Model Overview
    - Layer 1: Physical Layer
    - Layer 2: Data Link Layer
    - Layer 3: Network Layer
    - Layer 4: Transport Layer
    - Layer 5: Session Layer
    - Layer 6: Presentation Layer
    - Layer 7: Application Layer
- TCP/IP Model

Local Signaling Media

- Serial Cabling Specifications
    - Media Interface Specifications
    - DCE and DTE Specifications
- Twisted-Pair Cabling Specifications
    - Cable Runs
    - Seven Keys to Successful UTP Wiring
- Fiber Optic Cabling Systems
    - Fiber Optic Cabling Types
- Wireless Networking Systems
    - Wireless Network Preparation

Ethernet

- Network Overview
    - Network Interface Cards
    - MAC Addresses
    - NIC Drivers
    - CSMA/CD Operation
    - Ethernet Collision Domain
- Ethernet Connectivity Standards
    - 10 Mbps Ethernet Connectivity Options
    - 100 Mbps Ethernet Connectivity Options
    - Gigabit Ethernet Overview
    - 10 Gigabit Ethernet Connectivity Options
- Ethernet Version II Frame Structure
    - Ethernet Type Field
    - IEEE 802.3 with 802.2 Frame Format
    - Captured Frame Displayed by a Protocol Analyzer
- Ethernet Equipment Overview
    - Ethernet Ports and Connectors
    - Half-Duplex and Full-Duplex Operation
    - Ethernet Hubs
    - Ethernet Switches
    - Integrating 10, 100, and 1,000 Mbps and 10 Gbps Ethernet
- Ethernet Performance Issues

Switching

- Switching Overview
    - Current Switch Installations
- Switch Operation Overview
    - The Learning Process

        - The Flooding Process
        - The Forwarding and Filtering Process
        - Switch Loop Problems
    - Switch Configuration
        - Port Security
    - Spanning Tree Algorithm Overview
        - STA Root Switch Election
        - STA Path Selection
        - Spanning Tree Timers
        - STA Self-Healing Ability
    - VLAN Overview
        - VLAN Configuration
        - VLAN Operation
        - VLANs on Multiple Switches
    - Switch Troubleshooting

Logical Addressing

- Logical Address Overview
- Binary Numbering
    - Converting Binary to Decimal
    - Converting Decimal to Binary
    - Conversion Practice
- Dotted Decimal Notation
- Logical Address Types
- Class-Based Addressing
    - Network-Specific Addresses
- Reserved Addresses
- Private Addresses
- Network Masking
- Classless Addressing

Address Resolution Protocol (ARP)

- Address Resolution Overview
- ARP Process
    - ARP Messages
- ARP Cache
    - ARP Command
- Gratuitous ARP
- Proxy ARP
- ARP Restrictions

Subnetting

- Subnetting Overview
    - Communication Between Hosts
    - IP Address and Mask
- Subnetting Basics
    - Subnet Rules
    - Subnetting Decisions
    - Four Key Addresses
- Case Study
    - Onageristic Analysis Inc.
    - Masking for Subnets
    - Masking for Interfaces
    - Headquarters Addressing
    - East Addressing
    - West Addressing

    - WAN Addressing

Routing

- Routing Overview
    - Logical Segmentation
- Static Links vs. Dynamic Routing
- Router Configuration Overview
    - Routing Protocols
    - Routing Metrics
- Routing Protocol Operation
    - Routing Information Protocol
    - RIP Routing Tables
    - Open Shortest Path First (OSPF)
    - Enhanced Interior Gateway Routing Protocol (EIGRP)
    - Border Gateway Protocol (BGP)

WAN Overview

- WAN Overview
    - Telecommunications Infrastructure
    - Connection Types: PVC and SVC
    - WAN Technologies
- WAN Circuit-Switching
    - Wide Area Transmission Rates
    - SONET
    - Leased Lines
- WAN Packet-Switching
    - Packet-Switching Networks
    - Metro/Carrier Ethernet
    - X.25 Overview
    - Frame Relay Overview

Network Layer Process

- Network Layer Processes Overview
- Logical Addressing
    - Network Loop Handling
    - Routing Decision-Making
    - Path Control
    - Multicast Management
- Communication Flexibility
    - Multiplexing
    - Data Length Management
- Quality of Service
    - Data Receipt Verification
- Diagnostics
    - Logical Error Reporting

Session Handling

- Session Handling Overview
- Process Identification
    - Application Port Numbering
    - Temporary Ports
    - Port Address Translation
- Connectionless Functions
    - Connectionless Support
- Connection-Based Functions
    - Connection Handshake
    - Connection Shutdown

Supporting Processes
- Supporting Processes Overview
- Dynamic Host Configuration Protocol (DHCP)
  - Four-Step IP Addressing Process
- Domain Name System (DNS)
  - Top-Level Domains
  - Country Domains
  - Dynamic DNS
- ICMP Overview
  - The ping Command
  - Variation Reports

Net BIOS and Net BEUI
- A Historical Perspective
  - What is NetBIOS?
  - NetBIOS Services
  - NetBIOS vs. NetBEUI
  - NetBIOS over TCP/IP
- Server Message Block
  - SMB Security
- NetBIOS Limitations
  - The net Commands
  - The nbtstat Command

Security
- Network Security Overview
  - Network Security Assessment
  - Attack Types
  - Hackers and Attackers
  - Authentication
  - Encryption
  - Intrusion Detection Systems
- Content Filtering
  - Firewalls
  - Personal Firewalls
  - Packet Filters
  - Proxy Servers
  - Stateful Inspection Firewalls
- Security Levels
  - Single-Layer Protection
  - Double-Layer Protection
  - Triple-Layer Protection
- Virtual Private Networks (VPNs)
- Develop a Security Plan
  - Vulnerability Assessment

User and Manager Processes
- User and Manager Processes Overview
- Terminal Emulation
- File Transfer
  - Connection-Based File Transfer
  - Connectionless File Transfer
- E-Mail
  - Sending E-Mail
  - Retrieving E-Mail
- Web Browsing

    - Uniform Resource Locator
- Network Management

Wireless LANs

- Wireless LAN Overview
    - Wireless LAN Components
    - Wireless Design Issues
- Wireless LAN Standards
    - IEEE 802.11a
    - IEEE 802.11b
    - IEEE 802.11*g*
- Wireless Security
    - Basic Security Steps
    - Wired Equivalent Privacy
    - Wi-Fi Protected Access
- Non-Standard Solutions

Instant Messaging

- Instant Messaging Overview
    - Integrated Communications
    - Presence Awareness
    - Security Issues
- Sarbanes-Oxley (SOX) Act
- Standards
    - SIMPLE
    - XMPP

Networking Advances

- Internet Protocol version 6 (IPv6)
    - IPv6 Addressing
    - Internet2
- Voice over IP (VoIP)
    - Uses for VoIP
    - Why VoIP Instead of Traditional Voice?
- Wireless Broadband
- Video over IP

Lab Exercises:

Lab 1: Network Equipment

- Identifying the Equipment
- Identifying the Cabling in the Classroom
- Identifying the Lab Configurations

Lab 2: Simple Networking with Ethernet

- Configuring your PC
- Cables Might Matter
- Connecting to the Hub
- Using netstat

Lab 3: Elementary Protocol Analysis

- The Protocol Analyzer
- Traffic Flow in a Hub Network
- Error Messages

Lab 4: Exploring Layer 2 Switching

- Using a Single Workgroup Switch
- Using Switches to Isolate Traffic Among Ports
- Viewing the Switch Forwarding Table
- Using Multiple Switches
- Controlling Traffic with the Spanning Tree Protocol

- Viewing Forwarding Tables from Other Vendors

Lab 5: Logical Addressing
- Identifying Classes of Addresses
- Identifying Public and Private Addresses
- Identifying Properly Formatted Masks
- Identifying Masks and Prefixes
- IP Network Address Selection
- Labeling an IP Network with Correct Addresses

Lab 6: Address Resolution Protocol
- View the ARP Cache
- Verify the ARP Cache Entries for the Classroom
- View an ARP Exchange Using the Protocol Analyzer

Lab 7: Subnetting
- Selecting Masks for Various Problems
- Creating a Subnet Plan
- Labeling the Network Diagram

Lab 8: Routing
- Add Routers to the Networks
- Convert Your Workstation to DHCP for Address Assignment
- Workgroup 1 Router Information
- Workgroup 2 Router Information
- Configurations

Lab 9: IP Header Analysis
- View Captured IP Header Messages
- Observe Fragmentation
- Watch the Effect of Traceroute
- Do Something Illogical

Lab 10: TCP Operation and Analysis
- Viewing a TCP Session
- Locating and Documenting the Three-Step Startup Process
- Locating and Documenting the Application Login Process
- Locating and Documenting the Logout Process
- Locating and Documenting TCP Session Termination

Lab 11: DHCP Operation and Analysis
- Viewing the Result of DHCP Failure
- Viewing Your DHCP Configuration
- View a UDP Header
- View the Four-Step DHCP Process

Lab 12: DNS
- Querying a DNS Server with nslookup
- Viewing a DNS Request
- Viewing a DNS Response

Lab 13: ICMP Operation
- Examining an Echo Request/Echo Response Message Pair
- Examining a Network Unreachable Message

Lab 14: Network Security
- Implementing the Windows XP Firewall Function
- Testing the Windows XP Firewall Function
- Viewing the Configuration of the Firewall Implementation in the Network
- Testing the Network Firewall Function

Lab 15: User Processes
- Viewing an SMTP Session
- Viewing a POP3 Session

Lab 16: Wireless Networking
- Setting up a Wireless Connection
- Verifying Your New IP Address
- Determining Your Wireless Connectivity

Lab 17: Instant Messaging
Lab 18: Leading Edge Process(es)
- Preparing for Voice over IP
- Placing a Call
- Watching the Call Process

Introduction to Windows Server 2008 R2 Operating System

The purpose of this course is to teach students the basic fundamentals of server administration with Windows Server 2008 R2. Topics include: network security; server roles; file system layouts; directory structures; users; groups; kernel parameters; disk management; basic O/S parameters; AD DS; security features in Windows Server; performance levels; and tools available to maintain and troubleshoot Windows Server.

Duration: 2 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Perform a local media-based installation of Windows Server 2008 R2.
- Describe server roles.
- Implement and configure an Active Domain Directory Service (AD DS) forest.
- Describe the concept of defense-in-depth and determine how to implement this approach with Windows Server.
- Identify the security features in Windows Server that help to provide defense-in-depth.
- Identify the network-related security features in Windows Server to mitigate security threats to you network.
- Identify and implement additional software components to enhance your organization's security.
- Monitor a server to determine the performance level.
- Identify the Windows Server tools available to maintain and troubleshoot Windows Server.
- Create and configure a virtual machine with Hyper-V.

Course Outline

Installing and Configuring Windows Server
- Installing Windows Server
- Managing Services
- Managing Peripherals and Devices

Lab Exercises: Installing Windows Server; Performing a Local Media-Based Installation; Configuring Windows Server; Configuring Services; Configuring Devices

Windows Server Roles
- Role-Based Deployment
- Deploying Role-Specific Servers

Lab Exercises: Implementing Server Roles; Determining the Appropriate Roles to Deploy; Deploying the Determined Server Roles

Implementing Active Directory Domain Services
- Introducing AD DS

- Implementing AD DS
- Managing Users, Groups, and Computers
- Implementing Organizational Units
- Implementing Group Policy

Lab Exercises: Lab: Implementing AD DS; Promoting a New Domain Controller; Creating an Organizational Unit; Configuring Accounts; Creating a GPO

Implementing IT Security Layers

- Overview of Defense-in-Depth
- Physical Security
- Internet Security

Lab Exercises: Implementing IT Security Layers; Implementing Physical Security; Configuring Security Settings in Internet Explorer

Implementing Windows Server

- Overview of Windows Security
- Securing Files and Folders
- Implementing Encryption

Lab Exercises: Lab: Implementing Windows Security; Configuring an Accounts Policy; Securing NTFS Files and Folders; Encrypting Files

Implementing Network Security

Students will also implement network-related security features in Windows Server.

- Overview of Network Security
- Implementing Firewall
- Network Access Protection

Lab Exercises: Implementing Network Security; Configuring Windows Firewall with Advanced Security; Configuring Compliance with NAP

Implementing Security Software

- Client Protection Features
- E-Mail Protection
- Server Protection

Lab Exercises: Implementing Security Software; Restricting Applications with AppLocker; Using the Security Configuration Wizard; Hardening the Security Settings on Windows Server 2008

Monitoring Server Performance

- Overview of Server Components
- Performance Monitoring

Lab Exercises: Monitoring Server Performance; Creating a Performance Baseline; Simulating a Server Load; Gathering Additional Performance Data; Determining Probable Performance Bottlenecks

Maintaining Windows Server

- Troubleshooting Windows Server Startup
- Server Availability and Data Recovery
- Applying Updates to Windows Server
- Troubleshooting Windows Server

Lab Exercises: Maintaining Windows Server; Troubleshooting the Startup Process; Installing and Configuring WSUS; Gathering Information to Start the Troubleshooting Process

Implementing Virtualization

- Overview of Virtualization Technologies
- Implementing Hyper-V Role

Lab Exercises: Implementing Virtualization; Creating the VHDs; Creating New Virtual Machines; Modifying Virtual Machine Settings; Creating and Applying Virtual Machine Snapshots

Introduction to the Linux and Unix Operating Systems

This course provides training on standard UNIX/Linux commands and utilities used for day to day tasks including file manipulation, program execution and control, and effective use of the shell and desktop environments. The course presents the concepts necessary to understand the way UNIX works as well as the system's most commonly used commands. Data manipulation utilities and shell syntax for synthesizing command pipelines are emphasized. Bourne shell, Bash shell, and Korn shell programming techniques are introduced so students will be able to read and modify existing shell scripts as well as create their own. Desktop environments are also introduced from a user's perspective, including common window managers, Open Office utilities and an introduction to configuration tools. Proficiency in applying new skills is reinforced with extensive hands on exercises after each module.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Demonstrate knowledge of Command Syntax
- Demonstrate knowledge of Controlling Processes
- Demonstrate knowledge of Using the File System
- Demonstrate knowledge of Shell Syntax
- Demonstrate knowledge of Data Manipulation Utilities
- Demonstrate knowledge of Controlling The Environment
- Demonstrate knowledge of Shell Scripting
- Demonstrate knowledge of Using Desktop Environments

Course Outline

- Introduction to UNIX
  - Design Philosophy
  - System Components
  - The Shell and Command Entry
  - Documentation
- Basic User Commands
  - Logging In and Logging Out
  - Command Line Editing
  - Navigating the File System
  - Viewing and Copying Files
  - Controlling the Terminal
  - Sending and Receiving Mail
- Text Editing
  - Types of Editors
  - From ed to ex to vi
  - Basic Editor Tasks with vi
  - Editing Multiple Files
  - Named Buffers
  - vi Startup File

- UNIX Processes
  - The UNIX Process Model
  - Process States
  - Monitoring and Controlling Processes
- The File System
  - File System Organization
  - File Types
  - File and Directory Naming Rules and Conventions
  - Commands for Navigating the File System
  - Introduction to Inodes
  - Ownership, Permissions, and Dates
  - Manipulating Files and Links
  - Manipulating Directories
  - Determining Disk Usage
  - Other File System Utilities
- Introduction to Shells: sh, bash, and ksh
  - Shell Functions
  - I/O Redirection and Pipes
  - Command Separation and Grouping
  - Background Execution
  - Filename Expansion
  - Shell Variables
  - Command Substitution
  - Quoting and Escaping Metacharacters
  - Bash Shell Features
  - Korn Shell Features
  - Command Execution
  - Startup Files
  - Customizing the User Environment
- Printing
  - Printing Under AT&T UNIX
  - Printing Under BSD UNIX
- Multitasking and Batch Processing
  - Multitasking
  - Scheduled Execution Using cron
  - The at and batch Commands
- Shell Programming
  - Shell Script Features and Capabilities
  - Creating and Running a Script
  - Working With Variables
  - Environment Variables
  - Working With Data Types
    - Formatting
    - Base Conversion
    - Setting Special Attributes
  - Input/Output Techniques
  - Conditional Constructs
    - if/then
    - else/elif
  - Looping Constructs
    - for, while, until
  - Math Operators
- Advanced Shell Features

    - Manipulating Strings
    - Writing and Calling Functions
    - Controlling Process Priorities
    - Interpreting Command Line Arguments
    - Making Scripts Interactive
    - Special Shell Variables
    - Advanced I/O with Streams
    - Improving Performance of Scripts
- Text Manipulation Utilities
    - Editing a File from a Script
    - Scripting with ed or sed
    - UNIX and Linux Utilities to Manipulate Files
    - Regular Expressions
    - grep and egrep
    - The Stream Editor sed
    - Sorting in Scripts
    - Generating Reports with awk
    - Splitting Large Files
    - Counting Words, Lines, and Characters
    - Transforming File Contents
    - Extracting Text Strings
- File Processing Utilities
    - Examining and Comparing Files
    - Reporting Differences Between Files
    - Comparing Files of Any Format
    - Displaying Data in Octal and Hex
    - Compressing Data
    - Converting File Formats
- Backing Up Files
    - Backup Media
    - UNIX Device Names
    - tar and cpio
    - File Transport and Conversion with dd
- Networking Commands
    - UNIX Network Applications
        - Remote Execution Commands
        - Remote Activity Reporting
        - Communicating with Remote Users
    - Internet Applications
        - ftp, tftp, telnet
    - Remote Access Control Mechanisms
    - Using the Secure Shell(ssh)
- Desktop Environments
    - KDE Menus, Toolbars, and Tools
    - Gnome Menus and Tools
    - Open Office
        - Write
        - Calc
        - Impress
        - Math
        - Draw
        - Base
    - Introduction to YaST

Lab Exercises: Attendees will complete lab exercises which will demonstrate their ability to apply the skills obtained.

Introduction to Storage/SAN Technologies

An introduction to storage networking and SAN architectures are covered in this course. Topics include: the capabilities and limitations of various supporting technologies and SAN management in enterprise environments; component installation and configuration; building a simple SAN fabric; and SAN management applications.

Duration: 3 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design, build, and implement a simple SAN fabric
- Understand the differences between supporting technologies
- Explain SAN protocols and standards
- Utilize SAN management applications including Fibre Channel, iSCPI, and IP Storage

Course Outline

- The capabilities and limitations of various supporting technologies and SAN management in enterprise environments
    - Protocols
    - Standards
- SAN Design and Implementation considerations
- Component installation and configuration
- Building a simple SAN fabric
- SAN management applications
    - Fibre Channel
    - iSCSI
    - IP Storage

Lab Exercises: Attendees will build a simple SAN fabric.

Introduction to Relational Database Design Concepts

Topics in this course include: designing a relational database; capturing the structure of an existing database with a CASE tool; developing a data model to describe an application's data; applying normalization to data for effective, and stable database design. Basic database design includes data normalization, primary/foreign key constraints and indexes.

Duration: 1 Day

Lesson Objectives

Upon completion of this course, attendees will be able to:

- Design a relational database
- Capture the structure of an existing database with a CASE tool
- Develop a data model to describe an application's data
- Apply normalization to data for effective, stable database design

Course Outline

Introduction

- An overview of DBMS technology
  - How data is accessed, organized and stored
  - The database development process
- DBMS and related user tools
  - Query and application development tools
  - CASE tools for database analysis and design

How a Relational DBMS Works

- Relational technology fundamentals
  - Tables, attributes and relationships
  - Primary and foreign keys
  - Relational integrity constraints
  - Manipulating data: selection, projection, join, union, intersection, difference
- Components of a relational DBMS
  - An integrated, active data dictionary
  - The query optimizer

Designing Relational Databases

- A step-by-step approach and techniques
  - Developing the logical data model
  - Mapping the data model to the relational model
  - Specifying integrity constraints
  - Defining the data in the data dictionary
- Entity-relationship modeling
  - Capturing entities, attributes and identifiers
  - Describing relationships: one-to-one, one-to-many, many-to-many
  - Optional and mandatory relationships
  - Resolving many-to-many relationships for implementation
- Normalizing data to design tables
  - Avoiding update anomalies
  - Identifying functional dependencies
  - Applying rules for normalization
- Working with a CASE tool
  - Reverse engineering to capture the design of an existing database
- Physical database design
  - Assigning tables to disk files for performance and maintenance
  - Fragmenting large tables
  - Planned denormalization vs. accidental denormalization
  - Indexing for performance and integrity

The Future of Database Design

- Enforcing business rules for data integrity
  - Defining declarative constraints
  - Server-side programming in a procedural language
- Trends

- Modeling in analysis and design
- Focusing on business rules
- Creating an intelligent server

Lab Exercises: The attendees will practice:

Analyzing an existing database with a CASE tool
Developing data models
Identifying entities, attributes and relationships
Normalizing data to create stable table structures

Introduction to SQL Programming Language

This course will begin to prepare the database administrator to code using SQL. Topics include: writing SQL code to build SQL Server or Oracle database structures; updating database content with SQL and transaction handling; retrieving data from simple or multiple tables; processing data with row and aggregate functions; manipulating data with correlated and non-correlated subqueries, developing test queries, and avoiding common pitfalls.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Write SQL code based on ANSI/ISO standards to build SQL Server or Oracle database structures
- Update database content with SQL and transaction handling
- Retrieve data from single or multiple tables
- Process data with row and aggregate functions
- Manipulate data with correlated and non-correlated subqueries
- Develop test queries and avoid common pitfalls

Course Outline

- SQL Overview
  - Outlining SQL as the cornerstone of database activity
  - Describing the fundamental building blocks: tables, columns, primary keys and foreign keys

Building the Database Schema

- Creating tables and columns
  - Building tables with CREATE TABLE
  - Modifying table structure with ALTER TABLE
  - Adding columns to an existing table
  - Removing tables with DROP TABLE
- Protecting data integrity with constraints
  - Guaranteeing uniqueness with primary key constraints
  - Enforcing integrity with foreign key constraints
  - Imposing business rules with check constraints
  - Enabling and disabling constraints
  - Removing constraints with ALTER TABLE
- Improving performance with indexes
  - Expediting data retrieval with indexes
  - Recommending guidelines for index creation

Manipulating Data
- Modifying table contents
  - Adding table rows with INSERT
  - Changing row content with UPDATE
  - Removing rows with DELETE
- Applying transactions
  - Atomic Consistent Isolated Durable (ACID) rules
  - Controlling transactions with COMMIT and ROLLBACK
- Writing Single Table Queries
  - Retrieving data with SELECT
  - Restricting rows with the WHERE filter
  - Sorting the result with ORDER BY
  - Handling NULL values in expressions
  - Avoiding NULL value pitfalls in filter conditions

Querying Multiple Tables
- Applying the ANSI/ISO standard join syntax
  - Matching related rows with INNER JOIN
  - Including non-matched rows with OUTER JOIN
  - Creating a Cartesian product with CROSS JOIN
- Combining results with set operators
  - Stacking results with UNION
  - Identifying matching rows with INTERSECT
  - Utilizing EXCEPT to find nonmatching rows

Employing Functions in Data Retrieval
- Processing data with row functions
  - Conditional formatting with the CASE expression
  - Utilizing the CASE expression to simulate IF tests
  - Dealing with NULL values
- Performing analysis with aggregate functions
  - Summarizing data using SUM, AVG and COUNT
  - Finding the highest/lowest values with MAX and MIN
  - Defining the summary level with GROUP BY
  - Applying filter conditions with HAVING

Constructing Nested Queries
- Applying subqueries in filter conditions
  - Correlated vs. non-correlated subqueries
  - Testing the existence of rows
- Including subqueries in expressions
  - Placing subqueries in the column list
  - Creating complex expressions containing subqueries
  - Handling subqueries that return no rows

Developing In-Line and Stored Views
- Breaking down complex problems
  - Selecting data from a query result set
  - Subqueries in the FROM clause
- Creating views in a database
  - Building reusable code
  - Updateable vs. non-updateable views

Executing queries
- Analyzing query plans
- Enhancing query performance
- Selecting the best alternatives
- Avoiding errors and pitfalls

Lab Exercises: Creating and modifying tables, constraints and indexes, Modifying table contents, Retrieving data from tables, Joining multiple tables, Applying row and aggregate functions, Embedding subqueries within statements, Creating test queries and analyzing query plans

New Trends in Database Technologies

This is a reoccurring course introducing new technologies to the database administrator. The course content will change as needed but at least annually.

Junior Database Administrator Learning Lab

This lab will prepare the participant for the Competency Lab. Exercises will be provided that will demonstrate the participant's readiness to complete the Competency Lab.

Junior Database Administrator Competency Lab

This lab will provide the opportunity for the Junior Database Administrator to demonstrate their ability in the skills necessary to advance to the next job classification level.

Relational Database Design

The objective of this course is to consider the logical design of relational databases using a methodology known as semantic data modeling and related practical techniques.

Duration: 2 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Build a logical data model of increasing complexity and accuracy
- Transform a logical model into a physical model for a relational database
- Use object oriented and semantic modeling techniques to refine a model
- Identify classic structures and patterns which may be reused among many different models
- Utilize star schemas, snowflake schemas and data warehouse models
- Use a data model diagramming tool and CASE tools
- Consider the physical objects of a relational database and how they implement a logical model

Course Outline

- About Data Modeling & Relational Database Design
- What Is Data Modeling?
- About System Design Methodologies
- More About Case Tools
- Building a Simple Data Model
- Identifying Entities
- Identifying Attributes
- A Simple Modeling Scenario
- Identifying Relationships
- A Simple Data Model Solution
- Achieving a More Accurate Model

- Supplementing the Requirements Specification
- Refining the Attribute Definitions
- Refining the Relationship Definitions
- Transform Data Model Into Application Database Model
- About Application Database Models
- Transformation To Relational Model
- Object Oriented Modeling
- Defining Domains
- Defining Supertypes & Subtypes
- Defining Arcs
- Defining Lattices
- Classic Structures & Patterns
- Basic Classic Structures
- Advanced Classic Structures
- Data Model Implementation Using Relational Databases
- Relational Implementation
- Electronics Database Logical Model
- Electronics Database Physical Model
- Supertype & Arc Transformation Options
- More About a Relational Database
- Relational Database Objects
- SQL DDL
- Data Warehouse Models
- What Is a Data Warehouse?
- About Warehouse Models & Terminology
- Star Schema Model
- Snowflake Schema Model
- Contrast OLTP & Warehouse Databases

Lab Exercises: Attendees will complete exercises that will demonstrate their ability to apply skills obtained.

Developing Complex SQL Queries

Topics covered include: developing complex and robust SQL queries, querying multiple tables with self-joins; transforming data with built-in functions; summarizing data using aggregation and grouping; and building simple and correlated subqueries.

Duration: 2 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Develop complex and robust SQL queries
- Query multiple tables with self-joins
- Transform data with built-in functions
- Summarize data using aggregation and grouping
- Build simple and correlated subqueries

Course Outline

Querying Multiple Tables

- Implementing various types of joins
  - Equijoins vs. theta joins
  - Adding filter conditions to outer joins
- Writing self-joins
  - Joining a table to itself
  - Chaining self-joins
  - Solving time-interval problems

Scalar and Aggregate Functions

- Taking advantage of scalar functions
  - Converting data types
  - Performing calculations on dates and times
  - Extracting date and time components
  - Manipulating strings
  - Choosing the right function for the job
- Building crosstab reports
  - Using CASE to turn rows into columns
  - Applying PIVOT

Performing Analysis with Analytic Functions

- The OVER clause
  - Specifying the ordering before applying the function
  - Splitting the result set into logical partitions
- Calculating ranks
  - RANK and DENSE_RANK
  - ROW_NUMBER with ordered sets
- Extending the use of aggregates
  - Partitioning in multiple levels
  - Comparing row and aggregate values

Building Subqueries

- Simple subqueries
  - Subqueries in conditions and column expressions
  - Creating multilevel subqueries
  - Avoiding problems when subqueries return NULLs
- Correlated subqueries
  - Accessing values from the outer query
  - Avoiding accidental correlation
- Common table expressions
  - Reusable and recursive subqueries
  - Traversing hierarchies

Breaking Down Complex Queries

- Overcoming SQL limitations
- Reducing complexity and improving performance
- Exploring alternatives for decomposing: temporary tables, views, common table expressions

Lab Exercises: Handling NULL values in expressions and conditions, Implementing self-joins and coding inner and outer joins, Computing aggregate results, Employing ranking and analytic functions, Reusing subqueries as common table expressions

Intermediate Database Administrator Learning Lab

This lab will prepare the participant for the Competency Lab. Exercises will be provided that will demonstrate the participant's readiness to complete the Competency Lab.

Intermediate Database Administrator Competency Lab

This lab will provide the opportunity for the Intermediate Database Administrator to demonstrate their ability in the skills necessary to advance to the next job classification level.

Advanced Relational Database Design

This course will first quickly review relational databases, including entity-relationship model, relational algebra, SQL, relational normalization, and SQL in application programs, and then more carefully discuss relational calculus. Two main parts of the course are object-oriented databases and XML databases. For the first part, the motivation and concepts of the object data model, the ODMG standard, and object-oriented extensions of SQL will be discussed. For the second part, semi-structured data, XML basics and DTD, XML schema, XML query languages including XPath, XSLT, and XQuery will be covered. Other topics include: how queries are processed and optimized, and a study of distributed databases.

Duration: 3 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Create object-oriented databases
- Create XML databases
- Optimize queries

Course Outline

- Overview: Review
  - Relational Databases
  - ER Model/Diagrams
  - SQL
  - Keys and Constraints
- Relational Algebra and SQL DML, Aggregates, Views, and Updates
- Relational Normalization
  - Importance of Normalization
  - Redundancy
  - Anomaly
  - Functional Dependence
  - Normal forms BCNF and 3NF
  - Decomposition
  - Lossless
  - Dependency Preserving
- SQL in the Real World
  - Embedded SQL
  - Data Passing
  - Status
  - Cursor
  - Connection
  - Transaction
  - Stored Procedure
  - Dynamic SQL

    - Parameter
    - Descriptor
    - JDBC
    - SQLJ
    - ODBC
- Relational Calculus
    - Tuple RC
    - Relationship with SQL
    - Domain RC
- Visual Query Languages
    - Calculi –vs. Algebra
    - Recursion in SQL
- Object Databases
    - From Relational to Object-Oriented
- Object-Relational Databases
    - Objects in SQL
- ODMG Standard Architecture
    - ODL
    - OQL
    - Language Bindings
- Review of XML Databases
- XML Namespaces, DTD, XML Schema
    - XPath
    - XPointer
- Recursion in SQL
- XML Query Languages
    - XSLT
        - Stylesheet
        - Templates
        - Evaluation
- XQuery
    - FLWR Expression
    - Evaluation
    - Built-in Functions
    - User-defined Functions
    - Aggregation
    - Quantification
- Query Processing
    - External Sort
    - Duplicate Removal
    - Computing Projections
    - Computing Selections
    - Access Path
- Computing Joins
    - Block Nested Loops
    - Index-nested Loops
    - Sort-Merge
    - Hash
    - Star Joins
- Query Optimization
    - Equivalence Rules
    - Heuristics
    - Pushing Selections and Projections In

  - Pipelining
  - Cost Estimation
  - Estimating Output Size
  - Choosing Query Evaluation Plan
  - Incremental Update for Optimization
- Distributed Databases
  - Kinds of Data Distribution
  - Views of Developers
  - Data Fragmentation
  - Replication
  - Performance Analysis
  - Query Planning
  - Cost Analysis
  - Semijoin
  - Pushing

Lab Exercise: The lab exercise is on the design and implementation of a database system and has two parts. The first part includes the use of object-oriented features. The second part includes the use of XML.

Advanced Topics

This course covers topics in depth for the Advanced Database Administrator including: advanced monitoring software packages such as HP Openview, Site Scope, Patrol, GRID, Forefront, and open source alternatives; parameters to monitor including appropriate thresholds; advanced backup/recovery methodology including deployment scripting, implementing, cloud solutions, mirroring, replication and troubleshooting; cloning or refreshes; compression; encryption; backup/recovery design and 3rd party integration; SQL tuning; resource management such as CPU limits; instance/database caging; cluster administration; cross platform migrations/conversions; advanced storage management for SANs, SAN replication; ASM, Veritas, or other database storage management solutions; wait events; blocking; cost vs. rules based optimization; locks; advanced SQLO, PL/SQL, T-SQL, or equivalent advanced SQL packages/languages; advanced database security including auditing; database firewalls; Active/Active Clusters; Active/Passive Clusters; design of business resumption strategies and understanding needs, provide recommendations and cost savings.

Duration: 3 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design, build and implement complex databases
- Implement advanced backup/recovery methodologies
- Monitor performance and enhance database efficiency

Course Outline

- Advanced Monitoring Software Packages
  - HP Openview
  - Site Scope
  - Patrol
  - GRID
  - Forefront

    - Open Source Alternatives
- Parameters to monitor
    - Appropriate Thresholds
    - Advanced backup/recovery methodology
        - Deployment scripting
        - Implementing
        - Cloud Solutions
        - Mirroring
        - Replication
        - Troubleshooting
        - Cloning or refreshes
        - Compression
        - Encryption
        - Backup/recovery Design
        - 3rd party Integration
    - SQL tuning
    - Resource management such as CPU limits
    - Instance/database caging
    - Cluster administration
    - Cross platform migrations/conversions
    - Advanced storage management for SANs
        - SAN replication
        - ASM
        - Veritas
        - Other database storage management solutions
    - Wait events
    - Blocking
    - Cost vs. rules based optimization
    - Locks
    - Advanced SQLO, PL/SQL, T-SQL, or equivalent advanced SQL packages/languages
    - Advanced database security including auditing
    - Database firewalls
    - Active/Active Clusters
    - Active/Passive Clusters
    - Design of business resumption strategies and understanding needs
    - Provide recommendations and cost savings

Lab Exercises: Attendees will complete exercises which will demonstrate their proficiency in utilizing the topics covered in this course.

Advanced Database Administrator Learning Lab

This lab will prepare the participant for the Competency Lab. Exercises will be provided that will demonstrate the participant's readiness to complete the Competency Lab.

Advanced Database Administrator Competency Lab

This lab will provide the opportunity for the Advanced Database Administrator to demonstrate their ability in the skills necessary to advance further.

MICROSOFT SQL SERVER PATH

SQL Server 2008 Comprehensive Introduction

Topics covered include: building and managing SQL Server 2008 databases; retrieving and manipulating data with SQL queries; securing and monitoring databases with Management Studio; replicating data over multiple servers with merge replication; and transforming data into strategic information using Business Intelligence processes.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Build and manage SQL Server 2008 databases
- Retrieve and manipulate data with SQL queries
- Secure and monitor databases with Management Studio
- Replicate data over multiple servers with merge replication
- Transform data into strategic information using Business Intelligence processes

Course Outline

Getting Started with SQL Server 2008
- Overview of SQL Server architecture
  - Fundamentals of relational databases
  - Client/server model
- SQL Server components and tools
  - SQL Server Management Studio
  - Business Intelligence Development Studio
  - SQL Server Agent
  - Database engine

Constructing the Database
- Creating a database
  - Allocating file size and growth parameters
  - Implementing database schemas
- Designing tables
  - Defining column attributes
  - Indexing tables with Management Studio
  - Adding, deleting or changing columns
- Protecting data with constraints
  - Enforcing uniqueness with primary key constraints
  - Building relationships with foreign keys

Server-Side Programming
- Data retrieval with Transact-SQL
  - Leveraging Query Designer to construct SQL statements
  - Writing multiple table join queries
  - Aggregating data for business analysis
- Modifying data
  - Adding new rows with the INSERT command
  - Changing targeted data with UPDATE
  - Deleting specific rows

- Programming constructs
  - Writing stored procedures for performance and productivity
  - Capturing change events with triggers
  - Simplifying data access with user-defined functions

Integrating with Client Applications

- Connecting to SQL Server
  - Authenticating with SQL Server and Windows logins
  - Programming client applications
- Interacting with Microsoft Office
  - Pulling data from SQL Server into Excel
  - Migrating an Access database to SQL Server
- Leveraging XML and .NET features
  - Retrieving data in XML form
  - Utilizing a .NET CLR component

Administering SQL Server 2008

- Securing the database infrastructure
  - Controlling access to SQL Server
  - Granting or revoking permissions
  - Defining roles and user memberships
- Running the Maintenance Plan Wizard
  - Automating backups by scheduling jobs
  - Checking database integrity and defragmenting data
  - Notifying operators via e-mail

Sharing Data through Replication

- Defining the replication architecture
  - Snapshot
  - Transactional
  - Merge replication
  - Choosing a replication strategy
- Configuring merge replication
  - Distributing published data
  - Subscribing to a publication

Business Intelligence Components

- Transforming data with Integration Services
  - Importing and exporting files
  - Moving and denormalizing data into a data warehouse
- Producing information with Analysis Services
  - Building multidimensional cubes
  - Predicting trends with data mining

Lab Exercises: Manipulating data with SQL, Integrating SQL Server with Office, Securing access to SQL Server from intruders, Backing up databases to prevent disasters, replicating data between multiple databases

SQL Server 2008 Database Administration

Topics covered include: administering SQL Server 2008 with SQL Server Management Studio and Transact-SQL; securing the server through logins and permissions management; automating administrative activities with SQL Server Agent multistep jobs; performing routine maintenance to correct fragmentation and database corruption; and identifying problems and monitoring server health.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Administer SQL Server 2008 with SQL Server Management Studio and Transact-SQL
- Secure the server through logins and permissions management
- Automate administrative activities with SQL Server Agent multistep jobs
- Perform routine maintenance to correct fragmentation and database corruption
- Identify problems and monitor server health

Course Outline

SQL Server 2008 Installation and Features
- Installing SQL Server
  - Choosing installation options
  - Upgrading from previous versions
- Essential tools
  - SQL Server Management Studio
  - Transact-SQL
  - SQL Server Configuration Manager
  - Policy-based Management

Creating and Managing Databases
- Storage structures
  - Creating databases and transaction logs
  - Defining file groups
- Managing database space
  - Permitting automatic database growth
  - Specifying database options
- Moving databases
  - Scripting objects and moving data with Transact-SQL
  - Detaching and attaching databases

Implementing Server and Database Security
- Creating logins
  - Contrasting Windows and SQL Server authentication
  - Making logins members of server roles
  - Enforcing password policy
- Authorizing database access
  - Adding users and defining new roles
  - Delegating privileges with predefined roles
  - Handling mis-mapped logins

Managing Permissions
- Granting database-scoped privileges
  - Permitting object creation
  - Granting blanket permissions
- Schemas
  - Designing schemas
  - Assigning a default schema
- Handling object-level permissions
  - Limiting object access
  - Meeting complex permission requirements with roles
  - Examining permission hierarchies

Recovering from Disasters
- Backing up databases

    - Choosing a recovery model
    - Performing full, log and differential backups
    - Reclaiming transaction log space
- Restoring databases
    - Recovering user databases
    - Testing recovery scenarios

Automating Tasks with Jobs and Alerts

- The SQL Server Agent
    - Configuring the agent
    - Setting up Database Mail
- Multistep jobs
    - Defining jobs to handle routine tasks
    - Creating alerts and operators
    - Associating alerts with jobs

Performing Database Maintenance

- Fragmentation and database corruption
    - Identifying and curing fragmentation
    - Finding and repairing database corruption
- Database Maintenance Plan Wizard
    - Choosing maintenance tasks
    - Scheduling plan execution

Monitoring SQL Server

- Ad hoc monitoring
    - Identifying problems with Activity Monitor
    - Querying Dynamic Management Objects
- The Management Data Warehouse
    - Configuring data collection
    - Reviewing the reports

Lab Exercises: Administering SQL Server with graphical tools and Transact-SQL, Implementing security for logins, databases and objects, Backing up and restoring databases, Managing transaction logs, Configuring Database Mail, Monitoring server health

SQL Server 2012 Administration Skills Upgrade

Topics covered include: leveraging the new SQL Server 2012 administrative features; building database high-availability solutions with AlwaysOn Groups; implementing user-defined server roles to delegate responsibilities; resolving performance problems by examining waits; and configuring a contained database to achieve deployment flexibility.

Duration: 3 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Leverage the new SQL Server 2012 administrative features
- Build database high-availability solutions with AlwaysOn groups
- Implement user-defined server roles to delegate responsibilities
- Resolve performance problems by examining waits
- Configure a contained database to achieve deployment flexibility

Course Outline

Introducing the New Database Engine Features
- Installing SQL Server
  - Assigning service accounts
  - Choosing installation options
  - Acquiring the AdventureWorks sample database
- Exploring Licensing
  - Core vs. Server and CAL licenses
  - Maximizing virtualization opportunities
  - Upgrading to SQL Server 2012
- Planning an upgrade
  - Installing the Upgrade Advisor
  - Analyzing pre-2012 databases
- Migrating a legacy SQL Server database
  - Comparing an in-place upgrade with migration
  - Transferring a database to 2012

Implementing AlwaysOn Availability
- Demystifying AlwaysOn availability groups
  - Combining clustering, mirroring and replication
  - Choosing an architecture
- Configuring an availability group
  - Setting up the SQL Server group for high availability and disaster recovery
  - Monitoring with the Availability Group Dashboard
- Offloading resource-intensive tasks to secondary servers
  - Taking full and transaction log backups
  - Running report queries

Securing SQL Server 2012
- Taking advantage of user-defined server roles
  - Segregating roles and responsibilities
  - Constructing a user-defined server role
- Applying new audit capabilities
  - Server-level audits
  - Auditing database events
  - Filtering audit events

Managing Contained Databases
- Comparing contained and noncontained databases
  - Considering the advantages of contained databases
  - Handling temporary tables with a contained database
  - Avoiding collation conflicts
- Developing and creating a contained database
  - Granting user access
  - Converting an old database to a contained database

Breaking Performance Bottlenecks in SQL Server 2012
- Querying important dynamic management objects
  - sys.syscacheobjects
  - sys.dm_os_waiting_tasks
  - sys.dm_exec_query_stats
  - sys.dm_os_wait_stats
  - sys.dm_os_volume_stats
  - sys.dm_os_performance_counters
- Exploring the plan cache
  - Viewing cache contents

    - Building a Database Engine Tuning Advisor (DTA) Workload
- Monitoring waits and queues to improve performance
    - Contrasting waits and queues
    - Analyzing significant wait types
    - Correlating waits and queues
- Simulating concurrent users
    - Investigating SQL Server Distributed Replay
    - Preprocessing the workload
    - Executing on multiple threads
- Employing extended events for performance tuning
    - Modules
    - Packages
    - Events
    - Predicates
    - Constructing packages
    - Resolving blocking problems with Extended Events

Applying Columnstore Indexes to Decision Support Queries

- Dissecting columnstore indexes
    - Comparing traditional and columnstore indexes
    - Determining when to apply a columnstore index
- Improving query performance
    - Designing the index
    - Measuring the impact of the index

Lab Exercises: Migrating databases to SQL Server 2012, Leveraging the new features in Management Studio, Configuring AlwaysOn availability groups, Defining SQL Server Audits, Creating a contained database to avoid orphaned users, Analyzing waits to troubleshoot performance problems

SQL Server 2012 Comprehensive Introduction

Topics covered include: creating and administering SQL Server 2012 databases; writing Transact-SQL queries to retrieve and manipulate data; securing, backing up, and monitoring databases with Management Studio; integrating SQL Server with Microsoft Office; and transforming data into strategic information using Business Intelligence (BI) components.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Create and administer SQL Server 2012 databases
- Write Transact-SQL queries to retrieve and manipulate data
- Secure, back up and monitor databases with Management Studio
- Integrate SQL Server with Microsoft Office
- Transform data into strategic information using Business Intelligence (BI) components

Course Outline

Introducing SQL Server 2012

- Overview of the SQL Server suite of products

    - Fundamentals of the relational database engine
    - Benefits of the Business Intelligence stack
- SQL Server components and tools
    - SQL Server Agent and Management Studio
    - Integration Services
    - Analysis Services
    - Reporting Services
    - Data Quality Services
    - Master Data Services

Building the Database

- Constructing a relational database
    - Choosing optimal file size and growth parameters
    - Working with database schemas
- Defining tables
    - Specifying appropriate data types
    - Indexing tables with Management Studio
    - Adding, modifying or removing columns
- Safeguarding data with constraints
    - Enforcing uniqueness through primary key constraints
    - Validating conditions with check constraints
    - Protecting relationships with foreign keys

Leveraging Server Programmability

- Retrieving data with Transact-SQL
    - Employing Query Designer to construct select statements
    - Analyzing data for aggregate functions
    - Retrieving data as an XML document
- Modifying data with SQL commands
    - Inserting new rows into tables
    - Updating targeted data
    - Deleting specific rows
- Developing programming constructs
    - Creating stored procedures for productivity
    - Writing user-defined functions to simplify queries
    - Deploying triggers to capture change events

Administering SQL Server Databases

- Executing the Maintenance Plan Wizard
    - Defragmenting data and checking database integrity
    - Improving performance by rebuilding indexes
- Automating administrative tasks
    - Scheduling repeating jobs
    - Implementing a backup strategy
- Monitoring SQL Server resources
    - Displaying current activity and expensive queries
    - Running reports with Management Studio
- Securing the database infrastructure
    - Authenticating SQL Server and Windows logins
    - Assigning users to database and server roles
    - Granting or revoking permissions

Integrating External Applications

- Connecting to Microsoft Office
    - Pulling data from SQL Server into Excel
    - Creating a front-end interface with Access
- Transferring business information

- Importing and exporting data from text files
- Migrating an Access database to SQL Server

Implementing Business Intelligence Solutions

- Extracting data with Integration Services
  - Transforming and cleaning data
  - Loading data into a data warehouse
- Information delivery with Reporting Services
  - Designing reports quickly with the Report Builder
  - Deploying reports for centralized access
- Aggregating data with Analysis Services
  - Building multidimensional cubes
  - Predicting trends with data mining
- Developing a Business Intelligence strategy
  - Leveraging SharePoint, Excel and PowerPivot
  - Transferring data into knowledge with BI functionality

Lab Exercises: Constructing tables and protecting data with constraints, Retrieving and modifying data with SQL, Moving data with the import/export utility, Automating tasks with the Maintenance Plan Wizard, Administering SQL Server security and resilience, Designing a Reporting Services report

SQL Server 2012 Database Administration

Topics covered include: administering SQL Server 2012 with SQL Server Management Studio and Transact-SQL; ensuring tight SQL Server security with logins, roles, users and permissions; developing backup strategies, performing backups and recovering from disasters; leveraging SQL Server Agent to automate administrative tasks and generate alerts; and isolating and repairing fragmentation and database corruption.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Administer SQL Server 2012 with SQL Server Management Studio and Transact-SQL
- Ensure tight SQL Server security with logins, roles, users and permissions
- Develop backup strategies, perform backups and recover from disasters
- Leverage SQL Server Agent to automate administrative tasks and generate alerts
- Isolate and repair fragmentation and database corruption

Course Outline

Getting Started with SQL Server 2012

- Setting up SQL Server 2012
  - Selecting installation options
  - Installing a named instance
- Leveraging essential tools
  - SQL Server Management Studio
  - Configuration Manager
  - Transact-SQL
  - sqlcmd
  - PowerShell
  - Dedicated Administrator Connection

Constructing and Managing Databases
- Inspecting storage structures
  - Relating servers, databases and files
  - Creating databases and transaction logs
  - Spreading data among file groups
- Upgrading and moving databases
  - Choosing between upgrade and migration
  - Detaching and attaching databases
- Controlling database space
  - Permitting automatic database growth
  - Adding database files to expand databases

Handling Server and Database Security
- Implementing server security
  - Comparing authentication modes
  - Defining logins
  - Creating user-defined server roles
  - Enforcing password policy
- Granting database access
  - Adding users and defining new roles
  - Delegating privileges with predefined roles
  - Repairing mis-mapped logins
- Creating contained databases
  - Examining components and terminology
  - Enabling contained databases
  - Contrasting SQL and Windows users
- Converting existing databases to contained databases
  - Discovering barriers to containment
  - Transforming current users

Granting and Revoking Permissions
- Managing database-scoped privileges
  - Permitting object creation
  - Giving blanket permissions
- Defining object-level permissions
  - Limiting object access
  - Meeting complex permission requirements with roles

Backup and Recovery
- Backing up databases
  - Selecting a recovery model
  - Running full, log and differential backups
- Restoring databases
  - Rebuilding the master database
  - Recovering user and system databases

Streamlining Tasks with Jobs, Alerts and Database Mail
- Configuring SQL Server Agent
  - Setting agent properties
  - Implementing database mail
- Defining jobs to handle routine tasks
  - Creating alerts and operators
  - Associating alerts with jobs and initiating multistep jobs

Database Maintenance and Monitoring
- Handling fragmentation and database corruption
  - Identifying and curing fragmentation
  - Repairing database corruption

- Building database maintenance plans
    - Scheduling plan execution
    - Notifying operators of success or failure
    - Resolving contention problems

Lab Exercises: Employing Transact-SQL and the graphical tools, Upgrading SQL Server 2005 and 2008 databases, Implementing security for logins, databases and objects, Creating contained databases, Repairing database corruption, Building a database maintenance plan

SQL Server: Backup, Recovery, and Tuning

This course provides the knowledge and skills to backup, recover, and tune a Microsoft SQL Server 2012 database. The course focuses on teaching individuals how to use SQL Server 2012 product features and tools related to maintaining a database.

Duration: 1 Day

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Describe the critical concepts surrounding backup strategies
- Explain the transaction logging capabilities within the SQL Server database engine
- Plan a SQL Server backup strategy
- Back up databases and transaction logs
- Manage database backups
- Understand the restore process
- Restore databases
- Work with Point-in-time Recovery
- Restore system databases and individual files
- Transfer data to and from SQL Server
- Import and export table data
- Insert data in bulk and optimize the bulk insert process

Course Outline

Understanding SQL Server 2012 Recovery Models

- Backup Strategies
- Understanding SQL Server Transaction Logging
- Planning a SQL Server Backup Strategy

Lab Exercises: Understanding SQL Server Recovery Models

- Plan a backup strategy
- Configure Recovery Models
- Review recovery models and strategy

Backup of SQL Server 2012 Databases

- Backing up Databases and Transaction Logs
- Managing Database Backups
- Working with Backup Options

Lab Exercises: Backup of SQL Server Databases

- Investigate backup compression
- Transaction log backup
- Differential backup
- Copy-only backup

- Partial backup

Restoring SQL Server 2012 Databases

- Understanding the Restore Process
- Restoring Databases
- Working with Point-in-time recovery
- Restoring System Databases and Individual Files

Lab Exercises: Restoring SQL Server 2012 Databases

- Determine a restore strategy
- Restore the database
- Using STANDBY mode

Importing and Exporting Data

- Transferring Data To/From SQL Server
- Importing and Exporting Table Data
- Inserting Data in Bulk

Lab Exercises: Importing and Exporting Data

- Import the Excel spreadsheet
- Import the CSV file
- Create and test an extraction package
- Compare loading performance

Application Development for SQL Server Databases

This course describes how to design, develop and monitor high performance, highly available data solutions with SQL Server 2012. This course focuses on creating plans and designs for database structure, storage, objects, and servers. Students will have the opportunity to practices hands-on skills and design tasks in a virtual lab environment and will learn about topics such as data compression, high availability, data migration, security, and scalability.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design an appropriate database server infrastructure for a given business application scenario
- Design a logical schema for a database based on application requirements
- Design the physical implementation of a database for a given set of requirements
- Evaluate options for including binary large object data in a database design
- Plan and manage indexes to optimize performance
- Describe the key considerations for designing security for SQL Server instances and databases
- Plan policy-based management to manage server instances, databases, and other SQL Server 2012 objects more efficiently
- Plan SQL Server health monitoring
- Implement SQL Server health monitoring by using SQL Server Utility
- Identify and implement the appropriate backup strategy for a given scenario
- Plan and manage multi-server maintenance and automation
- Understand the benefits of using PowerShell to manage SQL Server 2012
- Design an optimal replication strategy from a given set of business and technical requirements
- Plan and implement a high availability solution

Course Outline

Designing a Database Server Infrastructure
- Planning a Database Server Infrastructure
- Planning Server Hardware
- Considerations for Database Server Consolidation
- Managing Server Resources in a Consolidated Database Infrastructure

Lab Exercise: Planning Database Server Consolidation
- Planning for Consolidation
- Managing Resources for an Instance of SQL Server
- Managing Resources for Multiple SQL Server Instances on a Single Windows Server

Designing a Logical Database Schema
- Relational Database Design Techniques
- Planning Schemas and Tables

Lab Exercise: Designing a Logical Database Schema
- Plan a Database Schema
- Create a View to Display Employee Payment Information

Designing a Physical Database Implementation
- Planning Files and Filegroups
- Planning a Partitioning Data
- Planning Compression

Lab Exercise: Designing a Physical Database Implementation
- Planning Files and Filegroups
- Implement the Timesheet Archive Strategy

Incorporating Data Files into Databases
- Considerations for Working with Data Files in SQL Server 2012
- Implementing FileStream and FileTables
- Searching Data Files

Lab Exercise: Implementing a Solution for Storing Data Files
- Exercise 1: Creating a FileTable
- Exercise 2: Creating and using a Full-Text Index

Tuning Database Performance
- Optimizing Query Performance by Using Indexes
- Working with Query Plans
- Performance Monitoring

Lab Exercise: Using Indexes and Plan Guides
- Planning Indexes
- Testing Indexing Strategies
- Working with Execution Plans

Designing Database Security
- Introduction to Security Planning
- Planning Security
- Contained Databases
- Protecting Data with Encryption

Lab Exercise: Planning and Implementing Security
- Planning Server and Database Security
- Implementing a Data Access Strategy
- Implementing Transparent Data Encryption

Policy Based Management

- Introduction to Policy-Based Management
- Planning and Implementing Policy-Based Management

Lab Exercise: Planning Policy-Based Management

- Planning a Policy-Based Management Strategy
- Implementing Policy-Based Management
- Testing Policy Compliance

Monitoring Server Health

- Introduction to Server Health Monitoring
- SQL Server Utility

Lab Exercise: Monitoring Server Health

- Create a Utility Control Point
- Configure Health Policies

Designing a Database Backup Solution

- SQL Server Backup and Restore
- Planning a Recovery Strategy

Lab Exercise: Planning and Implementing a Backup Strategy

- Planning a Backup and Restore Strategy
- Implementing a Backup Strategy
- Performing a Piecemeal Restore

Automating Multi-Server Maintenance

- Overview of Maintenance Automation
- Managing Multiple Servers

Lab Exercise: Automating Multi-Server Maintenance

- Planning and Implementing a Multi-Server Environment
- Planning and Implementing Multi-Server Jobs

Managing SQL Server with PowerShell

- Introduction to Windows PowerShell
- Scripting with Windows PowerShell

Lab Exercise: Managing SQL Server with Windows PowerShell

- Using PowerShell to Manage SQL Server
- Creating PowerShell Scripts

Replicating Data

- SQL Server Replication
- Planning Replication

Lab Exercise: Planning and Implementing SQL Server Replication

- Planning Replication
- Implementing Replication

Planning High Availability

- High Availability in SQL Server 2012
- AlwaysOn Availability Groups

Lab Exercise: Implementing High Availability

- Creating an AlwaysOn Availability Group
- Using an AlwaysOn Availability Group
- Testing Failover for an AlwaysOn Availability Group

SQL Server T-SQL Programming

This course covers topics including: developing efficient T-SQL programs to access SQL Server databases; creating stored procedures and functions for maximum reuse and minimum code maintenance; designing modular applications using packages; managing data retrieval for front-end applications; and invoking native dynamic SQL to develop high-level abstract code.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Develop scalable, distributed applications with Transact-SQL to meet organizational requirements
- Create modular code using stored procedures and formulate triggers
- Develop reusable code with scalar and table-valued functions
- Handle Transact-SQL runtime errors to create robust software
- Audit data changes using AFTER triggers

Course Outline

- SQL Server Architecture
  - SQL Server edition overview
  - SQL Server Management Studio

Managing Tables with DDL

- Creating schemas
  - Referencing schemas versus using the default schema
  - Hiding schemas with synonyms
- Building tables
  - Selecting appropriate SQL Server data types
  - Constructing tables with CREATE TABLE
- Adding constraints
  - Enforcing uniqueness using PRIMARY KEY and UNIQUE constraints
  - Validating relationships using FOREIGN KEY

Retrieving Data with Transact-SQL Stored Procedures

- Batch and stored procedure processing
  - Minimizing network traffic using batches and procedures
  - Stored procedure compilation and execution
  - Using scalar functions
- Selecting data
  - Developing stored procedures that extract data from multiple servers
  - Executing dynamic queries using OPENROWSET and OPENQUERY
  - Executing remote procedures
  - Capturing RETURN values from stored procedures
- Declaring variables and parameters
  - Creating and utilizing local variables
  - Passing input and output parameters
- Calling built-in scalar functions
  - Converting data using CAST and CONVERT
  - Ordering data with ranking functions

Maintaining Data

- Modifying data

    - Ensuring data consistency with transactions and distributed transactions
    - Managing concurrency with isolation levels
    - SQL Server locking fundamentals
    - Avoiding blocking problems with read-committed snapshot isolation
- Programming procedural statements
    - Implementing conditions with IF...ELSE
    - Looping with WHILE and GOTO
    - Creating code blocks with BEGIN...END
    - Debugging T-SQL in Management Studio
- Handling errors
    - Communicating problems to the client with RAISERROR
    - Intercepting errors with TRY...CATCH
    - Dealing with open transactions
- Producing server-side result sets
    - Building and using temporary tables
    - Processing rows on the server with a cursor
    - Taking advantage of table variables

Developing Views, Functions and Triggers

- Storing queries on the server
    - Concealing complexity with views
    - Solving business problems using multi-statement table-valued functions
- Creating user-defined functions
    - Calculating values with scalar functions
    - Taking advantage of schema binding
- Formulating triggers
    - INSTEAD OF vs. AFTER triggers
    - Detecting row changes using the inserted/deleted tables
    - Tracing metadata changes with DDL triggers
    - Auditing user access using a LOGON trigger
    - Tracking data changes with the OUTPUT clause

Lab Exercises: Adding a column to a database table using ALTER TABLE, Passing data into a stored procedure using parameters, Intercepting errors with TRY...CATCH, Calling a user-defined function in a SQL statement, Writing triggers to carry out advanced validation, Tracing metadata changes with DDL triggers

Implementing Data Models and Reports with SQL Server 2012

This course teaches students how to empower information workers through self-service analytics and reporting. Students will learn how to implement multidimensional analysis solutions, create PowerPivot and tabular data models, deliver rich data visualizations with PowerView and SQL Server Reporting Services, and discover business insights by using data mining.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Describe the components, architecture, and nature of a BI solution.
- Create reports with Reporting Services.
- Create reusable report items that simplify self-service reporting.
- Manage report execution and delivery.

- Create a multidimensional database with Analysis Services.
- Implement dimensions in a cube.
- Implement measures and measure groups in a cube.
- Use MDX Syntax.
- Customize a cube.
- Implement a Tabular Data Model in PowerPivot.
- Use DAX to query a tabular model.
- Implement a Tabular Database.
- Use PowerView to create interactive data visualizations.
- Use Data Mining for Predictive Analysis.

Course Outline

Introduction to Business Intelligence and Data Modeling
- Introduction to Business Intelligence
- The Microsoft Business Intelligence Platform

Lab Exercise: Reporting and Analyzing Data
- Exploring a Reporting Services Repot
- Exploring a PowerPivot Workbook
- Exploring a Power View Report

Implementing Reports with SQL Server Reporting Services
- Introduction to Reporting Services
- Creating a Report with Report Designer
- Grouping and Aggregating Data in a Report
- Showing Data Graphically
- Filtering Reports by Using Parameters
- Publishing and Viewing a Report

Lab Exercise: Creating a Report with Report Designer
- Creating a Report
- Grouping and Aggregating Data

Lab Exercise: Enhancing and Publishing a Report
- Adding a Chart to a Report
- Adding Parameters to a Report
- Publishing a Report

Supporting Self Service Reporting
- Introduction to Self Service Reporting
- Shared Data Sources and Datasets
- Report Parts

Lab Exercise: Implementing Self Service Reporting
- Using Report Builder
- Simplifying Data Access for Business Users
- Using Report Parts

Managing Report Execution and Delivery
- Managing Report Security
- Managing Report Execution
- Subscriptions and Data Alert
- Troubleshooting Reporting Services

Lab Exercise: Configuring Report Execution and Delivery
- Configuring Report Execution
- Implementing a Standard Subscription

- Implementing a Data-Driven Subscription

Creating Multidimensional Databases
- Introduction to Multidimensional Analysis
- Creating Data Sources and Data Source Views
- Creating a Cube
- Overview of Cube Security

Lab Exercise: Creating a Multidimensional Database
- Creating a Data Source
- Creating and Modifying a Data Source View
- Creating and Modifying a Cube

Working with Dimensions
- Configuring Dimensions
- Defining Attribute Hierarchies
- Sorting and Grouping Attributes

Lab Exercise: Defining Dimensions
- Configuring Dimensions
- Defining Relationships and Hierarchies
- Sorting and Grouping Dimensions Attributes

Working with Measures and Measure Groups
- Working with Measures
- Working with Measure Groups

Lab Exercise: Configuring Measures and Measure Groups
- Configuring Measures
- Defining Dimension Usage and Relationships
- Configuring Measure Group Storage

Introduction to MDX
- MDX Fundamentals
- Adding Calculations to a Cube
- Using MDX to Query a Cube

Lab Exercise: Using MDX
- Querying a Cube by Using MDX
- Creating a Calculated Member

Customizing Cube Functionality
- Working with Key Performance Indicators
- Working with Actions
- Working with Perspectives
- Working with Translations

Lab Exercise: Customizing a Cube
- Implementing an Action
- Implementing a Perspective
- Implementing a Translation

Implementing a Tabular Data Model with Microsoft PowerPivot
- Introduction to Tabular Data Models and PowerPivot Technologies
- Creating a Tabular Data Model by Using PowerPivot for Excel
- Sharing a PowerPivot Workbook and Using PowerPivot Gallery

Lab Exercise: Using PowerPivot for Excel
- Creating a Tabular Data Model by Using PowerPivot for Excel

- Using a Tabular Data Model in Excel
- Sharing a PowerPivot Workbook to PowerPivot Gallery
- Using a PowerPivot Workbook as a Data Source

Introduction to DAX
- DAX Fundamentals
- Using DAX to Create Calculated Column and Measures in a Tabular Data Model

Lab Exercise: Creating Calculated Columns and Measures by Using DAX
- Creating Calculated Columns
- Creating Measures
- Using Time Intelligence
- Creating a Dynamic Measure

Implementing an Analysis Services Tabular Data Model
- Introduction to Analysis Services Tabular Data Model Projects
- Developing an Analysis Services Tabular Data Model in SQL Server Data Tools

Lab Exercise: Working with an Analysis Services Tabular Data Model
- Creating an Analysis Data Services Tabular Data Model from a PowerPivot Workbook
- Implementing a Perspective
- Implementing Partitions
- Deploying an Analysis Services Tabular Data Model
- Enabling Access to a Tabular Data Model
- Configuring DirectQuery Storage Model
- Implementing Security in a Tabular Data Model

Creating Data Visualizations with Power View
- Introduction to Power View
- Visualizing Data with Power View

Lab Exercise: Creating Data Visualizations with Power View
- Modify the Tabular Data Model
- Create a Simple Power View Report
- Using Interactive Visualizations
- Create a Scatter Chart and a Play Axis

Performing Predictive Analysis with Data Mining
- Overview of Data Mining
- Creating a Data Mining Solution
- Validating a Data Mining Solution
- Consuming a Data Mining Solution

Lab Exercise: Using Data Mining to Support a Marketing Campaign
- Using Table Analysis Tools
- Creating a Data Mining Model
- Using the Data Mining Add-in for Excel
- Validating Data Mining Models
- Using a Data Mining Model in a Report

SQL Azure

This class is an in-depth look at SQL Azure, the database cloud offering in Windows Azure. Learn the basics around server and database provisioning, valid Azure TSQL, and how security is implemented and managed. Advanced topics include partitioning with sharding, database design optimization, backup and synchronization via Synchronization Framework and Azure Data Sync and migrating various database scenarios to SQL Azure.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design high performance cloud based data storage solutions using SQL Azure
- Create reports using SQL Azure

Course Outline

Introduction to SQL Azure
- What is SQL Azure?
- How can it be used?
- Setup SQL Azure databases through Developer Portal

Lab : Setup Azure Account, Create a LiveID, Add SQL Azure subscription, Create SQL Azure server, Create SQL Administrators

SQL Azure RDBMS Support
- Supported Azure T-SQL
  - Creating Tables, Columns, and Indexes
  - Creating Temp Tables and Transactions
  - Creating Views and Stored Procedures

Lab : Create SQL Azure Databases, Create SQL Azure Tables, Views, Stored Procedures, Indexes, Transactions, Work with Temp Tables, Invalid Azure TSQL statements

SQL Azure Security
- How it works
- Creating and Assigning Firewall Rules
- Creating server logins
- Assigning permissions to Users
- Assigning Rights to Objects

Lab : Create Logins and Users, Assigning Roles, Assigning Rights to Objects

Programming SQL Azure
- Accessing SQL Azure
- Tools that make working with SQL Azure easier (Entity Framework and LINQ)
- Securing SQL Azure Data at Rest
- Sharding

Lab : Connecting to SQL Azure, Using SQL Server Management Studio, Using SQLCMD, Using Visual Studio 2010
Lab : Programming SQL Azure, Connecting to SQL Azure from code (.NET), Working with LINQ, Working with Entity Framework
Lab : Securing Data at Rest
Lab : Implementing Partitions and Shards, Implementing Horizontal Partitions, Implementing Vertical Partitions, Programming with Enzo SQL Shared

Maintaining and Optimizing SQL Azure
- Maintaining
  - •Perform baselines for on-premise and SQL Azure Databases
  - •Perform backups of SQL Azure using various tools
  - •Perform a restore of SQL Azure
  - •Use Query Analyzer and Client Statistics

- Optimizing
- Troubleshooting connectivity problems (DoS and Throttling).

Lab : Maintaining SQL Azure, Measure Latency to SQL Azure, Find database size, Monitor database sessions, Find top 5 queries (CPU and IO), Rebuild a database index
Lab : Performing Baselines, Use Enzo SQL to perform baselines
Lab : Backup SQL Azure (Azure Storage Account), Backup SQL Azure (SQL Management Studio), Backup SQL Azure (BCP), Backup SQL Azure (RedGate)
Lab : Restore SQL Azure (Azure), Restore SQL Azure (SQL Management Studio), Restore SQL Azure (BCP)
Lab : Using Query Analyzer and Client Statistics

Migrating and Synchronizing to SQL Azure

- Migrating to SQL Azure
- Using Microsoft Synchronization Framework and Azure Data Sync to synchronize your Azure databases with on-premise databases

Lab : Migrating to SQL Azure, Migrating the database schema, Migrating database data, Migrating with SQL Server Migration Assistant, Migration with SQL Azure Migration Wizard, Migrating with DAC Import/Export 2.0, Migrating with SQL Server Integration Services (SSIS)
Lab : Using Microsoft Sync Framework, Working with Microsoft Sync Framework
Lab : Using Azure Data Sync, Working with SQL Azure Data Sync

Business Intelligence with SQL Azure

- SQL Azure Reporting Services
  - Create SQL Azure Reporting Services Server Instances
  - Creating data sources in SQL Azure Reporting
  - Creating reports and deploying them to SQL Azure Reporting
- Using PowerPivot to connect Excel 2010 to SQL Azure data

Lab : Business Intelligence with SQL Azure, Working with SQL Azure Reporting
Lab : PowerPivot with SQL Azure

ORACLE 11*g* PATH

Oracle Database 11*g* Comprehensive Introduction

This introduction to Oracle covers the following topics: designing, building and managing Oracle 11*g* database applications; retrieving and manipulating data efficiently using SQL Developer; creating and managing database tables, sequences, and synonyms; ensuring data integrity, enforcing security and enhancing performance; and writing structured PL/SQL code to develop stored procedures, triggers and packages.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design, build and manage Oracle 11*g* database applications
- Retrieve and manipulate data efficiently using SQL Developer
- Create and manage database tables, sequences and synonyms
- Ensure data integrity, enforce security and enhance performance
- Write structured PL/SQL code to develop stored procedures, triggers and packages

Course Outline

- Introduction to Oracle 11*g* Technology
    - Fundamentals of relational databases
    - Client/server model
    - Applying data modeling techniques
    - Oracle database tools: SQL Developer and SQL*Plus

Database Installation and Administration

- Assessing the Oracle database architecture
    - Defining memory structures, processes and SGA
    - Establishing a storage framework
- Creating a database
    - Allocating file size and growth parameters
    - Implementing database schemas
- Designing tables
    - Defining column attributes
    - Indexing tables with Management Studio
    - Adding, deleting or changing columns
- Protecting data with constraints
    - Enforcing uniqueness with primary key constraints
    - Building relationships with foreign keys
- Managing Oracle databases
    - Configuring Oracle Database 11*g*
    - Working with Oracle SQL Developer

Accessing and Manipulating Data

- Retrieving data efficiently with SQL Developer
    - Selecting, restricting and ordering data
    - Avoiding pitfalls in null values
    - Exploiting built-in SQL functions
- Applying powerful SQL techniques

    - Joins, outer joins and ANSI joins
    - Grouping data and applying aggregate functions
    - Combining result sets with set operators
    - Comparing simple and correlated subqueries
- Modifying data with SQL statements
    - Inserting, updating, deleting and merging data
    - Controlling transactions with ROLLBACK and COMMIT

Creating and Managing Database Objects

- Implementing the physical design
    - Mapping logical model to physical design
    - Creating users and schemas
- Constructing and maintaining tables
    - Altering and dropping columns
    - Restoring data with Flashback and the recycle bin
- Building views, sequences and synonyms
    - Filtering data with views
    - Generating unique IDs with sequences
    - Streamlining access to objects with synonyms

Maintaining Integrity, Security and Performance

- Enforcing integrity
    - Implementing referential integrity with primary, unique and foreign keys
    - Managing transactions and data with deferred and enforced constraints
- Securing the data
    - Authenticating users with password aging
    - Controlling access with system and object privileges
    - Simplifying privilege management with roles
- Improving performance
    - Guidelines for creating indexes
    - Indexing the data for optimal access
    - Managing unique, non-unique and composite indexes

Programming with PL/SQL

- Writing basic programs
    - Controlling logic with IF and CASE statements
    - Performing iterations with WHILE and FOR LOOPs
    - Defining and managing PL/SQL records
    - Trapping errors with exception handlers
- Processing data with cursors
    - Declaring cursors to perform row-level operations
    - Passing parameters to cursors to increase flexibility
    - Simplifying cursors with FOR LOOPs
    - Improving performance with CURRENT OF or ROWID

Implementing Server-Side Logic

- Modularizing code
    - Constructing procedures and functions
    - Debugging programs with DBMS_OUTPUT
- Creating packages and triggers
    - Bundling subprograms in packages
    - Defining statement and row-level triggers
    - Governing triggers with conditional predicates

Lab Exercises: Coding with SQL Developer and SQL*Plus, Retrieving and manipulating data with SQL constructs, Creating tables, sequences, views and synonyms, Managing security, integrity and performance, Programming with cursors, loops and control logic, Building procedures, packages and triggers

Oracle Database 11*g* Administration

This course provides an in-depth knowledge of Oracle database administration. Topics include: creating, maintaining and supporting Oracle 11*g* databases and instances; automating database administration tasks with Oracle Enterprise Manager 11*g* Database Control; providing transaction support and flashback capability with UNDO tablespaces; controlling user access and ensuring database security through privileges and roles; and partitioning large tables and indexes to ease administration and improve performance.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Create, maintain and support Oracle 11*g* databases and instances
- Automate database administration tasks with Oracle Enterprise Manager 11*g* Database Control
- Provide transaction support and flashback capability with UNDO tablespaces
- Control user access and ensure database security through privileges and roles
- Partition large tables and indexes to ease administration and improve performance

Course Outline

Installing SQL Server
- Choosing installation options

Upgrading from previous versions Introduction to Oracle Database 11*g* Administration
- Your responsibilities as an Oracle 11*g* DBA
  - Configuring the instance and database
  - Balancing user requirements and resources
  - Ensuring database availability
- The Oracle 11*g* architecture
  - Processing transactions with the server
  - Identifying types of processes and memory structures
  - Determining database file structure
  - Sizing the Result Cache for optimizing repeated queries

Building an Oracle 11*g* Database
- Creating the database
  - Simplifying memory allocation with memory targets
  - Establishing network connectivity
  - Converting from text-based to server parameter files
  - Configuring control files and redo log files
- Starting and stopping the database
  - Mounting and opening the database with SQL*Plus
  - Authenticating connections having SYSDBA privilege
  - Closing the database and shutting down the instance

Automating Database Management
- The Oracle Enterprise Manager architecture
  - Navigating the graphical interface
  - Comparing command-line and graphical techniques
- Administering with Database Control
  - Equipping Database Control to manage additional databases
  - Setting thresholds and generating alerts
  - Verifying changes in the data dictionary

- Performing privilege management

Performing Flashback Operations

- Managing space for rollback and read consistency
  - Configuring UNDO tablespaces
  - Monitoring expansion of rollback segments
  - Swapping to an alternative UNDO tablespace
- Resetting data to recent points in time with Flashback
  - Tracking changes to data values with row history
  - Obtaining transaction history with Flashback Transaction
  - Performing recovery of data with Flashback Table
  - Retrieving dropped tables and dependent objects from the recycle bin

Securing the Database

- Establishing user accounts
  - Authenticating users with password checking
  - Allocating space quotas for user schemas
  - Limiting resource usage through profiles
- Enforcing security
  - Granting and revoking system and object privileges
  - Simplifying privilege management with roles
  - Preventing changes to read-only tables

Controlling Database Storage

- Defining logical and physical structures
  - Creating, altering and dropping tablespaces
  - Handling sort data with temporary tablespaces
- Configuring storage patterns for database objects
  - Structuring data and index segments
  - Eliminating row migration with PCTFREE and Data Pump
  - Compressing table data to conserve storage
  - Shrinking tables and indexes online to regain space

Partitioning for Administration and Availability

- Creating table partitions and subpartitions
  - Selecting partitioning methods: range, list, hash, interval
  - Referencing the partitioning method in child tables
  - Administering partitions with merge, split, add and drop
- Maintaining index partitions
  - Maximizing performance with local and global indexes
  - Monitoring index partition usage
  - Rebuilding unusable indexes

Lab Exercises: Building an Oracle database
Maintaining UNDO tablespaces and retention periods to enable and perform flashback operations, Securing data by controlling user access with privileges, Monitoring and optimizing space usage, Setting up and maintaining partitioned objects

Oracle Database 11*g*: Backup, Recovery, and Tuning

This course covers the maintenance aspects of Oracle database administration. Topics include: implementing backup and recovery strategies to safeguard Oracle 11*g* databases; performing backup and recovery with Recovery Manager and Oracle Enterprise Manager; maintaining high availability with hot standby databases using Oracle Data Guard; alleviating bottlenecks by tuning the Oracle 11*g* server memory components; and automating server tuning with the workload repository and diagnostics information.

Duration: 4 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Implement backup and recovery strategies to safeguard Oracle 11*g* databases
- Perform backup and recovery with Recovery Manager and Oracle Enterprise Manager
- Maintain high availability with hot standby databases using Oracle Data Guard
- Alleviate bottlenecks by tuning the Oracle 11*g* server memory components
- Automate server tuning with the workload repository and diagnostics information

Course Outline

Safeguarding the Database
- Ensuring resilience
  - Configuring and protecting redo logs and control files
  - Achieving total recall with Flashback Data Archive
- Performing backups
  - Selecting appropriate backup strategies
  - Implementing hot and cold backups
  - Managing the Flash Recovery Area
- Recovering the database
  - Database, tablespace and datafile recoveries
  - Flashing back the database to a recent point in time

Performing Backup and Recovery with Recovery Manager (RMAN)
- Setting up Recovery Manager
  - Creating and merging recovery catalogs
  - Implementing virtual private catalogs
  - Configuring channels and redundancy
- Backup operations with RMAN
  - Working with full and incremental backups
  - Listing and reporting on RMAN operations
  - Maintaining the redo stream with archival backups
  - Protecting datafiles with multisection backups
- Performing automated recovery
  - Rolling forward image copies with incremental backups
  - Tuning backup processing with block change tracking

Managing Backup and Recovery with Oracle Enterprise Manager (OEM)
- Automating backup and recovery operations
  - Configuring default settings
  - Navigating the screens to perform backup and recovery
- Repairing lost data with Data Recovery Advisor
  - Obtaining advice for repairing data failures
  - Executing repairs
  - Classifying and closing failures

Disaster Recovery with Data Guard
- Establishing the standby environment
  - Building and synchronizing the standby database
  - Creating the standby with active database duplication
  - Controlling log shipping and redo apply mechanisms
- Managing the standby database
  - Maintaining a read-only standby during recovery
  - Synchronizing the standby with incremental backups
  - Preserving the performance of the primary database
- Moving operations to the standby
  - Failing over and switching to the standby facility
  - Achieving No-Data-Loss and delayed recovery

Configuring and Tuning the Oracle Server
- Tuning the SGA
  - Tuning the buffer cache with the Buffer Cache Advisor
  - Reducing I/O with multiple buffer pools
  - Monitoring latch contention
- Enhancing query performance with result cache
  - Controlling result cache usage with table annotations

    - Monitoring the result cache with DBMS_RESULT_CACHE

Oracle 11*g* Server Automated Tuning

- Automatic Workload Repository (AWR)
    - Performing root-cause analysis with the Automatic Database Diagnostics Monitor (ADDM)
    - Tracking session activity with Active Session History (ASH)
    - Handling logging and tracing with Automated Diagnostics Repository (ADR)
    - Managing deferred and historical statistics
- Automatic Memory Management (AMM)
    - Tuning memory with the memory advisors
    - Enabling total memory management with AMM
- Generating workloads for predictive testing
    - Capturing workloads with Database Replay
    - Analyzing and evaluating the results of the replay session\

Lab Exercises: Building a fault-tolerant database, Enabling fast recovery with flashback database, Backing up and recovering databases with RMAN and OEM, Creating an Oracle 11*g* Data Guard environment, Activating the standby database, Improving the performance of commonly used queries

Application Development for Oracle Databases

This course covers topics including: designing and implementing efficient applications while incorporating Oracle features; loading data into Oracle database using SQL Loader or external tables; maintaining and securing the database with advanced application techniques; enhancing applications with key Oracle-provided packages; and improving query performance using the Oracle-provided toolset.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Design and implement efficient applications while incorporating Oracle features
- Load data into Oracle databases using SQL*Loader or external tables
- Maintain and secure the database with advanced application techniques
- Enhance applications with key Oracle-provided packages
- Improve query performance using the Oracle-provided toolset

Course Outline

Introduction to the Application Environment

- The Oracle database environment
    - Reviewing basic architecture concepts
    - Examining existing databases using the Data Dictionary
- Database design considerations
    - Managing basic storage structures
    - Enhancing performance with optional storage structures

Preparing the Database

- Populating the database
    - Loading data from other sources using SQL*Loader
    - Writing to external tables using Data Pump
    - Upgrading to Data Pump with legacy mode
- Maintaining the application schema

    - Implementing best practices for PL/SQL structures
    - Generating DDL for existing objects

Exploiting Oracle Built-In Packages

- Automating routine processing
    - Scheduling routines with Oracle Scheduler
    - Starting jobs based on system or application events
    - Grouping scheduled jobs
- Handling other media types
    - Programming with LOBs
    - Providing transparent compression, encryption and deduplication with SecureFiles

Maintaining the Database

- Applying advanced programming techniques
    - Developing modular code using packages
    - Managing default, serializable and autonomous transactions
    - Resolving potential trigger problems
- Securing the database
    - Enforcing security using PL/SQL
    - Implementing row-level security applications
    - Controlling access with Oracle Label Security
- Upgrading the application
    - Building a new application version using Edition-Based Redefinition
    - Implementing the new version

Improving Query Performance

- Identifying basic tuning techniques
    - Developing a tuning methodology
    - Planning and managing the tuning process
- Employing tuning tools
    - Running EXPLAIN PLAN and autotrace
    - SQL Trace and TKPROF output
- Query tuning techniques
    - Optimizing join operations
    - Partitioning data to improve access to frequently used data
    - Storing rows in sorted sequence with sorted hash clusters

Deciphering and Controlling the Optimizer

- Optimizer concepts
    - Gathering system statistics with DBMS_STATS
    - Managing low-selectivity columns with histograms
- Influencing the Optimizer
    - Utilizing hints and optimizer mode
    - Determining the driving table

Tuning the Application

- Optimizing performance
    - Exploring B-Trees
    - Bitmapped, function-based and other indexing options
    - Partitioning indexes with virtual columns
    - Monitoring index usage with invisible indexes
- Tuning with the automated tools
    - Tuning SQL with the SQL Tuning Advisor and the SQL Access Advisor
    - Identifying performance problems with Real-Time SQL Monitoring

Lab Exercises: Loading data into an Oracle database, Automating processing with job scheduling, Utilizing performance diagnostic tools, Influencing the optimizer, Implementing tuning techniques, Enhancing performance with Real-Time SQL Monitoring

Oracle PL/SQL Programming

This course covers topics including: developing efficient PL/SQL programs to access Oracle databases; creating stored procedures and functions for maximum reuse and minimum code maintenance; designing modular applications using packages; managing data retrieval for front-end applications; and invoking native dynamic SQL to develop high-level abstract code.

Duration: 5 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Develop efficient PL/SQL programs to access Oracle databases
- Create stored procedures and functions for maximum reuse and minimum code maintenance
- Design modular applications using packages
- Manage data retrieval for front-end applications
- Invoke native dynamic SQL to develop high-level abstract code

Course Outline

Introduction and Overview
- PL/SQL fundamentals
  - Declaring and anchoring variables to database definitions
  - Flow control constructs
- Oracle 10*g* and 11*g* PL/SQL features
  - PL/Scope in Oracle 11*g*
  - CASE statement process flow
  - Referencing PL/SQL records in DML
  - Improving performance with native compilation

Data Manipulation Techniques
- Maintaining data with DML statements
  - Employing the RETURNING INTO clause
  - Solving the fetch-across-commit problem
- Managing data retrieval with cursors
  - Implications of explicit and implicit cursors
  - Simplifying cursor processing with cursor FOR LOOPs
  - Embedding cursor expressions in SELECT statements
- Cursor variables
  - Strong vs. weak cursor variables
  - Passing cursor variables to other programs
  - Defining REF CURSORS in packages

Developing Well-Structured and Error-Free Code
- Error handling using EXCEPTIONs
  - Propagation and scope
  - "Retrying" problem transactions with EXCEPTION processing
- Debugging PL/SQL blocks
  - Simplifying testing and debugging with conditional compilation
  - Interpreting compiler messages
  - Applying structured testing techniques
  - Building and applying a test bed
  - Leveraging the debugging facilities in SQL Developer

Achieving Maximum Reusability
- Writing stored procedures and functions
  - Calling and invoking server-side logic
  - Passing input and output parameters
  - Implementing an autonomous transaction
- Coding user-written functions
  - Calling PL/SQL functions from SQL
  - Building table-valued functions
- Developing safe triggers
  - Employing :OLD and :NEW variables
  - Avoiding unreliable trigger constructs
  - Exploiting schema and database triggers

Exploiting Complex Datatypes
- Collection types
  - PL/SQL tables, nested tables, VARRAYs
  - Stepping through dense and nonconsecutive collections
- Bulk binding for high performance
  - Moving data into and out of PL/SQL blocks
  - BULK COLLECT INTO and FORALL
  - BULK cursor attributes
  - BULK EXCEPTION handling

Invoking Native Dynamic SQL
- Finessing the compiler
  - The EXECUTE IMMEDIATE statement
  - The RETURNING INTO clause
- Types of dynamic SQL
  - Building SQL statements during runtime
  - Autogenerating standard code
- Package Tips and Techniques
  - Package structure: SPEC and BODY
  - Eliminating dependency problems
  - Overloading for polymorphic effects
  - Evaluating application frameworks
  - Declaring and using persistent global variables

Lab Exercises: Encapsulating data manipulation statements in stored procedures, Performing complex data manipulation with cursors, Leveraging EXCEPTIONs to handle runtime errors, Creating triggers to handle data integrity and derivation, Utilizing weak and strong cursor variables for dynamic SQL

Implementing Data Models and Reports with Oracle 11*g*

In this course, attendees learn to progressively build an OLAP data model to support a wide range of business intelligence requirements; to design OLAP cubes to serve as a summary management resource for existing SQL table queries; to leverage the power of Oracle OLAP by adding rich analytic content to your data model; to create sophisticated reports of OLAP data by using simple SQL queries; to create and execute OLAP queries in SQL Developer, and Oracle Application Express (APEX); to implement cube security, including how to authorize access to cube data and methods for scoping user views of data; and, to design OLAP cubes for performance and scalability.

Duration: 5 Days

Learning Objectives

Upon completion of this course, attendees will be able to:
- Design and create an Oracle OLAP data model

- Enable query rewrite to OLAP Cube MVs for relational summary management
- Easily create OLAP calculations that enrich the analytic content of your data model
- Query OLAP data using simple SQL
- Implement cube security
- Efficiently design cubes for performance and scalability

Course Outline

Examining the Role of Oracle OLAP within the Oracle BI / DW Platform
- Oracle OLAP and the Oracle BI / DW Platform
- Features of the Oracle OLAP Option
- Accessing Oracle 11g OLAP data

Understanding the Dimensional Model
- Stored and Calculated Measures
- Dimensions
- Hierarchies
- Levels
- Attributes

Building OLAP Cubes
- Using the Cube Building Tool
- Creating Dimensions
- Designing Cubes
- Creating Measures
- Mapping to Source Data
- Loading Data

Examining Cube-Organized Materialized Views (Cube MVs)
- Benefits of Cube MV Summary Management
- General Requirements for rewrite to MVs
- Designing Cube MVs
- Using Cube MVs

Creating Calculated Measures
- Examining OLAP Calculation Types
- Using the Calculation Builder
- Creating Common Business Calculations
- Creating Custom Calculations

Using SQL to Query Oracle OLAP Cubes
- Understanding Cube Views
- Querying OLAP Cubes: The Basics
- Leveraging Cube Summaries
- Applying Query Filters
- Joining OLAP and Relational Data

Enhancing Analytic Content
- Creating Cubes with Varying Dimensionality
- Integrating Measures from Data with Different Dimensionality
- Creating Forecast Measures Using OLAP DML

Using Ad Hoc Query and Reporting Tools Against OLAP Data
- Exploring OLAP Data Using Oracle Application Express (APEX)
- Performing Ad Hoc Query of OLAP Data Using Oracle BI Answers
- Examining Metadata Requirements for BI Tools

Implementing Cube Security
- Understanding Authentication Requirements
- Authorizing Access to Cube Data
- Examining User and Object Privileges

- Examining Methods for Scoping User Views of Data

Designing Cubes for Performance and Scalability

- Objectives of Performance and Scalable Design
- Examining how Data is Stored in Oracle Cubes
- Identifying Cube Features that Impact Performance and Scalability
- Implementing Design Techniques for Performance and Scalability

Examining Performance Tuning

- Describing How Cubes are Stored
- Understand Cube Build Processing
- Examining Balanced Configurations
- Correcting Performance Bottlenecks

Lab Exercises: Attendees will complete lab exercises which will demonstrate their ability to apply the skills obtained.

Oracle VM

Oracle VM training provides an in-depth look at Oracle VM and enables students to rapidly deploy environments, configure the systems for optimal use, implement best practices and more expeditiously resolve potential issues. Topics include: best practices; networking concepts; storage concepts, manageability with Oracle VM Manager, Oracle VM Manager CLI, XM CLI, and Grid Control Plugin; migration, RAC, loss of service; performance; backup and recovery; security and advanced configuration; troubleshooting; and Template Builder/Assembly Builder including JeOS.

Duration: 3 Days

Learning Objectives

Upon completion of this course, the attendees will be able to:

- Deploy VM environments
- Configure and optimize the VM environment
- Implement best practices in the design of a VM environment

Course Outline

- Best Practices
  - Designing the Server pool
  - Architecting the Storage
  - Architecting the network
  - Scalability and future growth considerations
- Networking
  - Oracle VM Networking concepts
  - Understanding Bonds and Bridges
  - Network stability and reliability
  - Lab Exercise: Advanced Networking / Simulated Failover testing
- Storage
  - Oracle VM storage concepts
  - SAN / NAS / iSCSI interfaces
  - Multi.pathing
  - Lab Exercise: Repository Setup / Simulated Failover testing
- Manageability
  - Oracle VM Manager

        - User and group administration
        - Advanced Guest VM configuration
        - What can¡¦t be done in the manager
        - Lab Exercise: Advanced Oracle VM Manager configuration
    - Oracle VM Manager CLI
        - Where does it belong and what can you do with it
        - Commands
        - Lab Exercise: Oracle VM Manager CLI
    - XM CLI
        - Commands
        - Lab Exercise: XM CLI
    - Grid Control Plugin
        - How to configure the plugin
        - Security configuration
        - Monitoring of the Guest VMs
        - Lab Exercise: Tying Oracle VM into Grid Control
- High Availability
    - Live Migration
    - Automatic failover
    - RAC
    - Loss of Service
- Performance
    - Identifying performance issues
    - I/O and memory analysis
    - Understanding and resolving network issues
    - Understanding and resolving storage related issues
    - Lab Exercise: Understanding and resolving Performance issues
- Backup and Recovery
    - Backup considerations for the Oracle VM server
    - Backup considerations for Guest VMs
    - Recoverability
    - Advanced backup and recovery utilizing a storage vendor¡¦s solution
    - Disaster Recovery VS
    - VM recovery
    - Lab Exercise: Backup / Recovery of Guest VMs
- Security and Advanced configuration
    - Oracle VM Security considerations
    - Guest VM security
    - Oracle VM Manager security
    - CPU pinning for a Guest VM
    - Adding a SAN disk to a Guest VM
    - Lab Exercise: Advanced Configuration and securing the environment
- Troubleshooting
    - Guest VM starting / stopping issue
    - Guest VM state issues
    - Accessing the Guest VM console
    - Shutting down the Server Pool Master
    - OCFS2
    - Lab Exercise: Finding and resolving issues
- Template Builder / Assembly Builder
    - JeOS
        - Configuring VM with JeOS
        - Lab Exercise: Building Templates

- Creating a template from a Guest VM
  - Configuring deployment scripts
  - Lab Exercise: Creating Templates and deploying them
- Assembly Builder
  - Logical assemblies
  - Configuring deployment scripts
  - Deploying assemblies
  - Lab Exercise: Building an assembly using the assembly builder

ORGANIZATIONAL / PROCESS COURSE DESCRIPTIONS

Organizational and Process Oriented courses are interdisciplinary courses that will be provided for all IT professionals in all State Agencies. The goal is to develop a common set of expectations and a framework for working together on IT projects regardless of which department and what project.

State of TN IT Professional Orientation Modules

These three (3) State of TN IT Professional Orientation Modules are provided in the Associate level training for all IT professionals and they would also be terrific courses to assist with training business professionals working within State Agencies, and Executives within the State who participate in planning for IT projects. Together these modules will be used to support the cultural shift within the State of TN IT environment to the desired culture of the NextGen IT Transformation. All three modules would become computer-based curriculum once the transformation is well underway. They will be taught in a classroom setting until there is evidence that the transformation has taken hold. The classroom setting will allow for the type of Q&A dialog that could be useful in supporting this transformation.

The specific course content will need to be closely coordinated with the State NextGen IT Transformation initiative. This is not an off-the-shelf series of modules. The learning objectives and course outlines below serve as a structure for the courses. Instructors must work closely with the State to communicate the specific messages of the initiative.

Duration: Each Module will be approximately 1 hour

Audience: All IT personnel, Agency leadership, Executives participating in IT project planning, may be relevant for vendors working in support of IT projects, products, or services.

Module #1: Orientation to TN IT Governance and Customer Service Mission

Learning Objectives

Upon completion of this course, attendees will be able to:

- Describe how IT operations and service delivery is organized within the State of TN
- Describe the types of products and services State Agencies can receive from State IT including OIR and BSD
- Describe the importance and practice of the customer-service mission
- Describe their personal responsibilities for working in the State of TN NextGen IT environment.

Course Outline

- Overview of the State of TN IT Governance
  - Offices, Departments providing IT services and products
  - Relationship between Agencies and State IT Departments and Offices
  - Role of Vendors in supporting IT products and services
  - Role of IT in working with Vendors
  - Introduction to OIR and BSD, and the types of services and products Agencies are able to receive from these State IT offices.
- The Customer-Service Mission - serving the people of the great State of TN
  - Who are State IT customers?
  - The importance of personal responsibility, integrity, and discipline in all IT professionals.
- The NextGen IT Environment
  - Expectations for team work, quality, collaboration, respect for others, and professional behavior
  - Day-to-day, work-specific impact of the customer-service mission on project teams, and IT professionals.
  - IT professional development plans including the new learning program

Module #2: Orientation to TN Business Solutions Methodology (TBSM)

The purpose of this module is to establish a common understanding of the life of a project within the State of TN, and to increase understanding of how the participants in the class fit into the project team, no matter if they are part of the technical team, a customer, an end user, a business manager, or a vendor.

Learning Objectives

Upon completion of this course, attendees will be able to:

- Describe at a high level how projects are planned, designed, executed, and operationalized within the State.
- Describe the primary types of projects the State of TN is likely to plan and execute
- Recognize where the work they typically do fits into the project lifecycle
- Know where to get more information on the project lifecycle

Course Outline

- High level introduction to the TBSM
- Why we have the TBSM
- How to assess support from BSD to further understand the methodology and use templates
- Different Types of State projects and how to approach these projects using the TBSM

Module #3: Orientation to TN Standard Software Development Process

Software Development Processes provide a framework for all software development projects regardless of size, complexity, and risk. The focus of this course is to establish an expectation for all software development projects to utilize a basic set of processes to ensure quality deliverables.

Learning Objectives

Upon completion of this course, attendees will be able to:

- Describe the expectation that all projects use standard processes and best practices
- Describe in general terms how the processes are applicable no matter what SD methodology is implemented on a project.
- Identify the SD processes and give a high level description of the purpose of the process
- Know where to get more information on the SD process

Course Outline

- Fundamentals of State IT Standard Software Development Processes
- Purpose behind State establishing minimal processes that are required for all SD projects
    - Benefits of using the State of TN Standard Software Development Processes
    - Examples of the kinds of trouble projects can experience when standard process is not utilized to structure the work.
- Difference between a Project lifecycle, Software Development Lifecycle, and the State's Standard Software Development Processes, and how they synch-up, (example where the SD process would fit in a Project lifecycle).
- High level description of each process and where it is used in the Software Development Lifecycle
- How to get additional training when needed

Team Roles and Responsibilities

This course is designed to build on the orientation modules. Building on the Standard TN Project Lifecycle and TN Software Development Lifecycle, the course will further define the roles and responsibilities of team members working on a project. The course will highlight the different types of projects that the State might undertake, and how the project teams vary in size and complexity. There will also be discussion of the importance of adapting in smaller

projects and even more carefully defining the roles and responsibilities of the team members because smaller projects often do not have the level of planning and oversight that larger projects receive.

Since this is a Junior level course, it will not go into depth about how to pull a team together or how to lead a team. The objective is for the participants to increase the understanding of the workings of a team and to reinforce the importance of stepping-up, taking personal responsibility for working as a part of the team by responding to the leadership within the team and giving their personal best to the team.

Duration: 3 hours

Learning Objectives

Upon completion of this course, attendees will be able to:

- Recognize varying size and complexity of team structures
- List the characteristics of effective team members
- Identify the roles and responsibilities found within teams
- Clarify roles and responsibilities on the team
- Respond to team leadership effectively

Course Outline

- Planning for success
    - What is a team?
    - Task oriented vs. team oriented behaviors
    - Team positioning
- Defining team roles
    - Productive team member roles
    - Destructive team member roles
    - Team accountability
    - Individual accountability
    - Interaction with team leadership
    - Monitoring team progress

Lab exercise: Participants will be given the opportunity to discuss the differing roles and responsibilities of the team members and share insights from previous team memberships both good and bad. Instructors will lead the conversation and be certain to include the topics covered in the course outline.

Time Management

For Junior level Database Administrators who are becoming more knowledgeable about what they can do with the technology but still having many new experiences, the ability to monitor their own use of time becomes more important. At this stage, they will be producing code for projects that have schedules and due dates for deliverables. They need to begin to know how to manage their time, focus their activities, and accurately evaluate the time needed for various tasks. This course will be a lab where participants will be given an opportunity to practice using techniques for organizing their work to increase efficiency and gain awareness through timed activities about how long tasks take for them individually and for the group. It would be nice to make this interactive and to include some opportunities for participants to share their own tips for improved accuracy and timeliness. It will be critical for the facilitator to set ground rules. The goal is not to be the fastest developer – the goal is for each person to know their own speed, and to know the optimum ways they personally produce the best quality within the timeframes provided.

Duration: One Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Set S.M.A.R.T. goals
- Prioritize goals effectively

- Understand the needs of different personality styles and how to work with them
- Handle high pressure, crisis situations
- Prioritize time and tasks effectively
- Achieve better results through effective planning
- Overcome procrastination
- Estimate time and activities required for reaching goals
- Handle paperwork effectively
- Manage resources more efficiently
- Organize workspace
- Use time management tools more effectively
- Become effective at delegating for maximum productivity

Course Outline

- Working with Goals
  - S.M.A.R.T. (Specific, Measurable, Attainable, Relevant, Time-Bound) Goals
  - Prioritizing Goals
- Working with Others
  - Personality Types A, B, C, and D
  - Recognizing and Working With Different Personality Types
  - Team Dynamics that Affect Timely Deliverables
  - Handling Crisis Situations and Project Delays
- Prioritizing Time & Tasks
  - The 80/20 Rule
  - The Urgent/Important Matrix
  - Assertiveness
- Planning Wisely
  - Creating a Productivity Journal
  - Glass Jar: Rocks, Pebbles, Sand and Water
  - Estimating Time and Activities
  - Processing Required Paperwork
  - Managing Available Resources
- Organizing Workspace
  - De-clutter
  - Managing Workflow
  - Dealing with E-mail
  - Using Calendars
- Delegating Made Easy
  - When to Delegate
  - How to Delegate
  - Managing Responsibility when Delegated

Lab Exercise: Participants will be given the opportunity to practice using techniques presented for organizing their work to increase efficiency and gain awareness through timed activities of how long tasks take for them individually and for the group.

Foundations of TN Standard Software Development Processes

This series of modules will provide a deeper dive into the processes. These modules will be 1-2 hours in length and can be web-based. They will result in participants being able to carry-out tasks within the process areas with supervision from the Lead Developer or Architect. The content should be relevant regardless of the software development lifecycle meaning that there are tools, techniques, practices that are relevant and tailor-able regardless if the development model is waterfall or agile or rapid prototyping. The difference is these approaches can be explained in the modules and even the benefits of using the different approaches and tools depending on the type of project.

Duration: Modules will be 1-2 hours in length – Web-based

Learning Objectives

Upon completion of this course, attendees will be able to:

- Carry out tasks within the process areas with supervision from the Lead Developer or Architect

Course Outline

- Analysis
- Defining Requirements
- Design
- Estimation
- Establishing and Migrating between Development, QA, and Production Environments
- Configuration Management
- Change Management.
- Testing and Verification
- Deploying to Production
- Production Operations
- Enhancements and Maintenance

It will be important to point participants toward tools and resources that can be used just-in-time because Junior developers will not engage in these activities on a daily basis and they will lose what they learn unless they have access to resources when needed.

Project Management Basics

As an Advanced or Lead Developer, a person might be responsible to manage more than the software development tasks. It is possible that a person would have to take responsibility for the larger tasks of planning and managing the full project. This course will provide a deeper awareness of how projects are planned, scheduled, budgeted, and monitored from start to finish. The goal is not to cover the depth of the PIMBOK but to help these Advanced level developers to further their knowledge and understanding of the key components of a project and where to find resources to help if they find themselves responsible for these kinds of activities for a project that would not receive assistance from BSD.

Duration: One Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Explain the importance of clearly defining a project, identifying sponsors, and generating buy-in.
- Identify barriers to running successful projects.
- Apply techniques for dealing with scope creep and changing priorities.
- Demonstrate how to ask effective questions to identify what's really important.
- Effectively apply techniques for running productive project meetings.
- Develop an action plan to address current project shortcomings.

Course Outline

- Defining a Project
    - Putting Together the Project Team
    - Asking the Right Questions
    - Identifying Stakeholders
    - Identifying Importance and Priority
- Developing a Schedule
    - Identifying Barriers
    - Milestones

    - Key Tasks and Dependencies
    - Determining Resource Requirements
    - Tracking with Gantt, PERT
- Managing the Expected and the Unexpected
    - Identify risk
    - Dealing with Expanding Requirements and Changing Priorities
    - Requirements Documentation
    - Building an Issues List
    - Writing Status Reports
    - Creating an Action Plan to Address Issues
- Coordinating a Project Team
    - Techniques for running Project Meetings
    - Assigning Responsibility
    - Following up with Team Members
- Maintaining Relationships
    - Lab exercise in solving issues related to communication problems
- Project Completion
    - Project Debriefing
    - Documenting issues for future projects

Lab Exercise: Participants shall take a small "project" and discuss forming the project team, developing the schedule, identifying risks, dependencies and dominant communication channels.

COMMUNICATION COURSE DESCRIPTIONS

Note: The facilitators will be very skilled at establishing a safe, collaborative environment themselves so that the role play and exercises are non-threatening and successful. In all courses such as this one the facilitators must recognize that they are teaching technical persons these 'soft' skills that do not always come as naturally as technical skills. Participants are likely to be reluctant and maybe intimidated to participate in role play and interactive activities.

Introduction to Technical Communication

This course will provide the Associate Developer with the most basic communication skills – writing and speaking, active listening, verifying what has been communicated. The context will be technical but the objective will be to shore up core communication skills and awareness of the importance of really communicating effectively in a technical environment. Course designers should take care to make the course applicable to the adult learner, keeping the learning interactive and engaging so that all learners will recognize some value and not leave with the impression that the course was too juvenile.

Duration: One to Two Days

Learning Objectives

Upon completion of this course, attendees will be able to:

- Define why listening is important
- Demonstrate the use of open-ended and closed questions
- Describe a model of feedback, communication, and listening
- Explain the importance of body language
- Effectively introduce themselves and others
- Rephrase blunt language for better communication
- List techniques for dealing with difficult people
- Develop an action plan to improve communication skills

Course Outline

- Communication as a Tool for Technology Professionals
  - Why Communication Skills are Critical with Other Technical Professionals
  - Why Communication Skills are Critical with Non-Technical Professionals
- Active Listening
  - How to Listen for Important Content
  - How to Respond to the Person Talking
  - How to Ask Questions Effectively
  - Verifying What Has Been Communicated Verbally
- Presentation Skills
  - Using Appropriate Affirming Body Language
  - Making an Introduction
- Rephrasing for Better Relationships
  - Phrases to Avoid
  - How Can the Point be Better Received
- Voicemail, Email, Memos, and More
  - How to use Office Communication Tools for Maximum Effectiveness
  - Verifying What Has Been Communicated in Written Form
- Introduction to Communicating Technical Information to Non-Technical People
  - How to Communicate Complex Information to Laymen
- Dealing with Challenges
  - Case-study evaluations of ways to deal effectively with difficult personalities and tough situations. From negative people, "backstabbers", whiners, to minimal contributors, participants will discuss better ways in which to communicate and work with those whose actions make the process hard.

Lab Exercises: This course has several labs including: practices in listening for comprehension, practices in writing emails and memos, practices in wording technical jargon for receipt by laymen, and those mentioned in the outline concerning dealing with challenges. The participant will also create an action plan to improve their personal communication skills.

Technical Documentation Skills

For the Junior Developer it is important to further refine the skills of technical documentation. This course will combine technical and communication concepts to increase participant ability to write useful comments in code, useful technical documentation regarding the software, and user support writing techniques for printed and electronic versions of help. Attention will be given to how to speak 'non-technically, how to break a process into a logical flow, and the importance of using of consistent terminology regarding common instructions such as clicking, selecting, buttons, links, pages, saving, deleting, etc. for the full project system – ensuring that the written communication will be successfully understood by someone who has not worked on the system.

Duration: One or Two Days

Learning Objectives

Upon completion of this course, attendees will be able to:

- Identify different types of technical documents
- Adapt writing style to meet the intended audience's knowledge level
- Organize information in a logical way
- Structure a technical document in a logical way
- Adhere to organizational guidelines/requirements for technical documentation format and content
- Follow existing template and formats
- Insert graphics and tables into a technical document in appropriate places
- Check and edit technical documents written by the attendee or by others
- Prepare a technical document for presentation or publication
- Use multimedia to disseminate the technical document

Course Outline

- Different types of Technical Documents
  - Requirements Documents
  - Design Documents
  - Software Source Code Comments
  - Software Revision History/Logs
  - Log Messages
  - Software Error Messages/Help Documentation
  - Software End User Documentation
  - Project Documentation
  - Tutorial Documents
- Why Are You Writing, and Who Is Your Audience?
  - Defining the purpose of the document
  - Keeping the reader in mind
- Planning Your Document
  - Organizing the information into a logical and manageable structure
  - Different formats and conventions for technical documentation
  - Setting up the plan and keeping track of progress
- Writing for Clarity and Impact
  - Maintaining consistency and flow of meaning
  - Maintaining organizational requirements for syntax and content
  - Using plain English when possible
- Use of Words, Graphics, and Tables
  - Dealing with jargon, technical words, acronyms and abbreviations

    - Consistency in Wording for Same Task or Idea
    - Incorporating diagrams where appropriate
    - Checking and Editing
    - Checking for Accuracy and Flow
- Presentation and Publication (for Published Documents only)
    - Preparing the document for publication
    - Techniques for design, layout and typography
    - Multimedia and Electronic Information Management

Lab Exercises: The exercises will include practices in writing snippets of each of the different types of technical documents efficiently and effectively utilizing all of the topics presented.

Customer Service

The focus of this course is to reinforce and further develop awareness and ability to work with the goal of service in mind. Many of the State's IT personnel do not have face-to-face interactions with the end users or 'the people' so the idea of giving them training regarding customer service may seem less than useful. The reason for this course is that customer service is a mindset – an approach to daily work as well as skills and abilities to engage and serve another person. This course will focus on both aspects.
Objectives:

- Reinforce the mindset of customer service as the driving motivator behind State IT activities – identify barriers to these critical values for the State IT environment such as pride in work, strong work ethic, effective solutions, cost effective results.
- Learn ways to actualize and internalize these values personally and professionally.

The format for the course should be interactive and dynamic with opportunities for role play, perhaps watching scenarios of worker interactions and discussion of how the values transfer to the work environment and the work produced.

Duration: ½ Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Understand how to promote collaboration
- Successfully collaborate with others
- Effectively handle team diversity
- Recognize positional boundaries and when it's appropriate to aspire to a new position
- Maintain flexibility in work schedule and project deliverable deadlines
- Identify areas for self-improvement
- Identify areas for team improvement

Course Outline

- Team Etiquette
    - Considerate Workplace Conduct
    - Respecting Team Members
    - Dealing with Diversity
    - Identifying and Addressing Sources of Conflict
    - Planned Intervention
- Boundaries
    - What are Positional Boundaries?
    - Vying for Position
- Flexibility
    - Adjusting Schedules and Priorities to Fit Changing Needs/Goals
- Self-Assessment

    - What Can Be Done To Make Me More Effective to the Team?
- Team Assessment
    - What Can Be Done To Make the Team More Effective?
    - Optimizing Team Performance

Lab Exercises: The lab for this course will include role playing with role switching and simple project team tasks.

Team Dynamics

The Team Dynamics course is for the Intermediate Developer who is functioning with less supervision and is now being required to take more responsibility for the success of the team. The course should include content related to working with Junior and Associate Developers, and Leads. This is an opportunity for an engaging workshop where roles and responsibilities can be reinforced. Participants should come away with a basic understanding of how to be a positive, contributing member of a team. They should have a basic understanding of team etiquette, boundaries, flexibility, and respect for each other. This is a course that all personnel will participate in at some point and it would be great to have it be multi-disciplinary so that role-switching and team tasks can be completed in the classroom.

Duration: ½ Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Understand how to promote collaboration
- Successfully collaborate with others
- Effectively handle team diversity
- Recognize positional boundaries and when it's appropriate to aspire to a new position
- Maintain flexibility in work schedule and project deliverable deadlines
- Identify areas for self-improvement
- Identify areas for team improvement

Course Outline

- Team Etiquette
    - Considerate Workplace Conduct
    - Respecting Team Members
    - Dealing with Diversity
    - Identifying and Addressing Sources of Conflict
    - Planned Intervention
- Boundaries
    - What are Positional Boundaries?
    - Vying for Position
- Flexibility
    - Adjusting Schedules and Priorities to Fit Changing Needs/Goals
- Self-Assessment
    - What Can Be Done To Make Me More Effective to the Team?
- Team Assessment
    - What Can Be Done To Make the Team More Effective?
    - Optimizing Team Performance

Lab Exercises: The lab for this course will include role playing with role switching and simple project team tasks.

Improving Understanding between Technical and Non-Technical Project Stakeholders

The Intermediate Developer is becoming highly technically fluent yet the need to speak non-technically is increasing. This course will help the participants recognize the change in their ability to talk effectively to a non-technical person.

The best approach to this course would be to have mini-movies of examples of ineffective and effective interactions between technical and non-technical people that the class can discuss, followed by role-playing verbal exchanges – especially using role-swapping exercises. Techniques for interpretation, translating, verifying understanding, preparing for presentations/meetings, and facilitating discussions should be presented and practiced.
Duration: ½ Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Communicate effectively with non-technical colleagues
- Illustrate methodologies or concepts when appropriate to aid in recipient understanding
- Present information effectively while actively listening to feedback
- Adjust communication as needed to further clarify ambiguous subjects/topics
- Present non-technical colleagues with understandable technical options

Course Outline

- How to use Analogies Effectively
- Limit Your Message to "Need-to-Know" Information
- Display Your Thinking Visually
- Involve the Listeners
- Manage the Intimidation
- Structure Your Message Effectively
- Avoid Projecting Opinion as Fact
- Helping Non-Technical People Make Sound Technical Decisions

Lab exercises: The exercises for this course will provide the attendees with opportunities to create communication documents (emails, memos, presentations) in a manner that non-technical staff can comprehend. Short verbal presentations and/or conversations will also be role played.

Technical Communications for Leads / Managers

This course is going to help the Advanced Developer become more proficient in technical documentation, communication with management and other stakeholders, and successful communication with developers and other technical team members who are seeking direction from the Lead developer. Again the focus will be written and verbal communication. It should address the individuals own communication as well as how to guide others in their communications, how to provide feedback, how to edit others documentation.

Duration: One Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Determine the content of your message
- Determine the best way to prepare and deliver your message verbally
- Examine the basics of building a well-structured presentation
- Examine the mechanics of delivering a successful presentation
- Manage team communications effectively

Course Outline

- Write to be Understood
    - Determine When to Write

    - Plan Your Message
    - Perfect Your Style and Mechanics
    - Writing in the Workplace
- Speak to be Heard
    - Prepare Your Message
    - Deliver Your Message
- Plan for High Impact Presentations
    - The Importance of Planning
    - Outline Your Presentation
    - Develop Your Script
    - Add Visual Aids
- Captivate Your Audience
    - Make Final Preparations
    - Basics of Delivery
    - The Question-and-Answer Session
    - Assess the Presentation
- Holding Effective Meetings
    - Clarify the Purpose of the Meeting
    - Create the Agenda
    - Lead a Session Effectively
- Managing Team Communications
    - Creating a Communications Plan
    - Determining what Tools will be used for Documentation and Communication
    - Providing Feedback
    - Editing Documents Produced by Others

Lab Exercise: The attendee will plan and present a short presentation given a specific topic.

Advanced Team Dynamics

The focus of this course is to engage Advanced personnel in techniques for working through difficulties and challenges of dysfunctional teams. *This course has the pre-requisite of completing the Team Building course in the Leadership Track prior to participating in the class*. It will be interactive and will address ways to overcome common problems such as poor performance, differing opinions, lack of communication, and lack of leadership.

Duration: One Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Define and understand the sources of conflict
- Resolve conflicts using different strategies
- Identify their own personal conflict resolution style
- Understand the different bases of power and how to change them
- Apply influence and explore their relationships with others
- Provide conflict management training for others

Course Outline

- Definitions of Conflict
    - Misconceptions about Conflict
    - Sources of Conflict
    - Positive and Negative Factors of Conflict
    - Business Management and Conflict Resolution
- Conflict Mode Instrument
    - Scoring and Interpretations

    - Ways of Coping with Conflict
    - Assumptions and Outcome of Conflict
- Influencing Others in a Problem-Solving Context
    - Working Effectively with Team Members
    - Managing Your Emotions, Information and Problems
    - Tips For Effective Day to Day Conflicts
    - Resolving Conflict before It Gets Out of Hand
    - Managing Conflicts with Superiors and Subordinates
- Importance of Team Work
    - Dealing with Dysfunctional Team Roles
    - Managing Conflict in Teams
- Influence Inventory (Power Bases)
    - Definitions of Influence and the Bases of Power
    - Changing the Bases of Power
    - Leadership Training for Influence and Power
    - Training Development for Influence

Lab Exercises: The lab for this course will be interactive role playing through situations presented in the exercises. Some of the situations included will be: slacking team member, conflict resolution, lack of communication, and lack of leadership.

PRACTICAL REASONING COURSE DESCRIPTIONS

Courses in this area of competency will expand upon the professional's ability to actively and skillfully conceptualize, apply, analyze, synthesize, and/or evaluate information gathered and to use these skills to create more effective, efficient, and appropriate deliverables; solve problems, and make decisions as necessary within their job classification.

Resources to Improve Practical Reasoning

This set of training modules will give State IT personnel access to ideas, tools, and methods to improve their ability to think critically, understand and solve problems more effectively, and make informed decisions. Many training vendors have extensive curriculum related to these topics so these modules are likely to come from a vendors existing course catalog. The lists below provide an example of the kinds of modules the State would like to have available for their personnel. The actual offering from a training vendor may be more extensive. These can be instructor-led, computer based, or lab courses.
Duration: Each module in a series will be a stand along module and should be no more than 1 hour.
Audience: These modules will be applicable to any IT personnel including those who are technically focused and those who are business focused. These modules will be available to anyone as electives that they can select on their own or as directed by their managers as part of their Individual Development Plan.

Critical Thinking Series

Learning Objectives

Upon completion of one or more modules, participants will be able to:

- Recognize how to think more logically,
- Identify ways to apply critical thinking methods to improve their own skills
- Identify ways to use critical thinking skills in their work

Course Outline

Topics for Modules will include but are not limited to:

- Organizing information – learning ways to organize information in a variety of ways
- Exploring ways to identify many possible options or alternatives to how information can be organized
- Methods for evaluating alternatives
- Evaluating data and finding the data most relevant to the task
- Drawing conclusions from information
- Identify what has not been stated when analyzing instructions, or steps in a process
- Developing originality and creative thinking
- Applying critical thinking techniques in the workplace
- Self-awareness – identifying strengths, and weaknesses, improving your own abilities.

Problem Solving Series

Learning Objectives

Upon completion of one or more modules, participants will be able to:

- Have an increased awareness of problem solving methods, tools and approaches
- Identify ways to use problem solving techniques to improve their work

Course Outline

Topics for Modules will include but are not limited to:

- Basic steps to solve a problem
- Finding and choosing tools and techniques to improve problem analysis
- Identifying and overcoming barriers to problem resolution
- Techniques for identifying and evaluating possible solutions
- Planning to implement a solution including ways to identify possible undesired outcomes and plan for contingencies
- Implementing a solution
- Evaluating the solution

Decision Making Series

Learning Objectives

Upon completion of one or more modules, participants will be able to:

- Recognize how to approach decision making more deliberately
- Understand what information may be needed to make a good decision
- Recognize that there are tools to help with different types of decision making
- Identify ways to improve their own decision making in the workplace.

Course Outline

Topics for Modules will include but are not limited to:

- Approaches to decision making
- Finding and choosing tools and techniques to structure and support decision making (for example, Financial decision tools, making decisions with limited or incomplete information)
- Identifying and dealing with your own biases

Using Critical Thinking, Problem Solving and Decision Making Techniques to Improve Deliverables

This course will be an experience-based lab designed to give attendees the opportunity to actively and skillfully conceptualize, apply, analyze, synthesize, and/or evaluate information using critical thinking and problem solving techniques and methods. They will be moderately complex scenarios that are designed for intermediate - Senior level developers.

Duration: 1 day

Audience: Developers, DBAs, Business Analysts

Learning Objectives

Upon completion of one or more modules, participants will be able to:

- Demonstrate the ability to use critical thinking techniques and methods to improve their designs and approaches to development tasks
- Identify their strengths and know how they can improve their skills

Course Outline

Problem-Solving and Decision Making
- Defining the Problem
  - Identifying the real problem
  - Finding true causes
  - Formatting the problem
  - Using a problem-solving method
  - What, where, when, extent
  - Distinctions between causes
- Defining the Objective
  - Mapping to the statement of the problem
  - Characteristics
  - Measurable: using an explicit format
  - Clarity
  - Relevant: showing the right content
  - Alignment with organizational objectives

How to Generate Alternative Solutions
- Role of creativity: thinking outside the box
  - Left vs. Right brain thinking
  - Convergent vs. divergent thinking
  - Creativity as a skill
  - Understanding barriers: Psychological, historical and sociological
- Techniques for generating ideas
  - Idea spurring
  - Attribute listing/five sensing
  - Brainstorming
  - Parnes' "The mess"
  - Stiker's Morphology

Evaluating Alternatives
- The six factors to determining feasibility
  - Technical: is it possible?
  - Risk
  - Economic
  - Developing cost and benefit estimates
  - Legal: is it against the law?
  - Operational: will it work for us?
  - Schedule: can we deliver it in time?
- Techniques for evaluating ideas
  - Nominal group technique
  - Cost/benefit analysis
  - Delphi technique
  - Weighted-decision model

Lab Exercises: The labs for this course should include exercises where the attendee can demonstrate the ability to use critical thinking techniques and methods presented to improve their designs and approaches to development tasks.

Collaborative Troubleshooting/Problem Solving/Decision Making

Maximizing the benefits of team collective reasoning when there is a technical dilemma is a core skill for technical leadership. People tend to fall into 'hero' mode – taking on the challenge single handedly when the situation really warrants a multi-disciplinary look, or 'hiding' mode – hoping someone else gets assigned to fix the problem or solve

the dilemma. People are either afraid of blame or looking at the problem as an opportunity to shine. So how does a leader determine if the problem needs individual or team investigation? When does someone need help and how do you ensure they get the right expertise to find the problem? How does a leader establish a synergy of team effort to tackle difficult problem, focusing the energy on the best possible solution? Techniques and approaches to collaboration will be explored, practiced through role play and discussion of scenarios.

Duration: 1 day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Foster collaborative thinking and problem solving
- Establish an environment conducive to collaboration
- Effectively manage discussion in a group
- Identify barriers to effective teamwork

Course Outline

- Learn about the benefits of collaborative thinking and problem solving
- Identify ways to bring a team together to collaborate
    - Establishing the proper environment within the space and between participants
    - Communicating the time allotted, scope of effort, methods to be used
- Demonstrate understanding of ways to encourage participation
    - Encouraging idea sharing, open discussion
    - Keeping the group on topic
- Identify barriers to collaboration and ways to overcome these barriers
    - Overcoming ‘group think’
    - Identifying and addressing team biases
- Maximizing the efforts of established teams
    - Getting to know each other’s strengths and how to encourage those strengths

LEADERSHIP COURSE DESCRIPTIONS

Note: The facilitators will be very skilled at establishing a safe, collaborative environment themselves so that the role play and exercises are non-threatening and successful. In all courses such as this one the facilitators must recognize that they are teaching technical persons these 'soft' skills that do not always come as naturally as technical skills. Participants are likely to be reluctant and maybe intimidated to participate in role play and interactive activities.

Team Building

This leadership course will be an invaluable course for personnel who are taking on a leadership role on their team. The course will provide new leaders with the core knowledge, skills, and abilities to provide direction, encourage participation, establish a 'safe' environment for sharing ideas, respect, and valuing the contributions of everyone. The course will include instruction as well as opportunity for discussion, role play, and review of effective and ineffective leadership styles.

Duration: One Day

Learning Objectives

Upon completion of this course, attendees will be able to:

- Apply different communication strategies to maximize motivation
- Develop and maintain high levels of trust with team members
- Enhance individual and team motivation on a consistent basis
- Lead by example with competence and trust based credibility
- Eradicate issues relating to inferior quality
- Deliver higher-quality outputs more quickly and efficiently
- Deliver effective praise and reprimand sessions to reinforce standards and performance
- Create a working environment that promotes high levels of collaboration and commitment
- Set and agree on challenging performance targets with team members – and achieve them
- Effectively resolve poor performance issues within the team
- Navigate change more effectively while maintaining team focus and motivation
- Create an effective action plan to maximize motivation and performance

Course Outline

- Communication
- Developing Trust
- Enhancing Motivation
- Leading by Example
- Dealing with Issues
- Improving Efficiency
- Praise and Reprimand Sessions
- Creating an Environment for Collaboration and Commitment
- Setting Performance Targets
- Resolving Poor Performance Issues
- Navigating Change
- Creating an Action Plan

Lab Exercises: This is a highly interactive class with lab exercises that will include the opportunity for discussion, role play, and review of effective and ineffective leadership styles.